

## ARCHIVES OF OTOTOLOGY.

### THE EXISTENCE OF THE TUBERCLE-BACILLUS IN AURAL DISCHARGE, AND ITS SIGNIFICANCE IN CLINICAL DIAGNOSIS.

By A. GOTTSTEIN, BERLIN.

(FROM THE POLICLINIC OF DR. ARTHUR HARTMANN, IN BERLIN.)

Translated by H. F. HANSELL, M.D., Philadelphia.

THE determination of the presence of tubercle-bacilli in certain cases of purulent middle-ear inflammation is, from several points of view, of the same importance as the discovery of its presence in the secretion and tissues of other organs. Since the existence of the tubercular inflammation of the middle ear has now been proven beyond question, a reliable clinical observation can establish the connection which exists between the tubercular ear affections and tubercular disease of other localities, especially the lungs. Moreover, the evidence of the presence of tubercle-bacilli in purulent middle-ear inflammation is of importance in determining the question as to the point of entrance of acute or chronic tubercular disease to within the skull. Thus far the well-known observations of Weigert and the case of Demme<sup>1</sup> have proven only one point of entrance—the nostrils, when they were the seat of tubercular disease. After the bacilli have been discovered in the middle ear there is no obstacle in the way of supposing they can make that the entrance-point and produce a tubercular affection of the contents of the skull.

The difficulty, however, here as in other cases lies in the possibility of adducing proof of the bacillus for clinical diag-

<sup>1</sup> *Berl. klin. Wochenschr.*, 1883, No. 15.

nosis. In drawing our conclusions we must distinguish between the organs affected. While we can with safety exclude the existence of a tubercular lung affection by the absence of the bacilli in only a few preparations of a suspected sputum, the bacilli are found in such small numbers in the secretion of tubercular bone and gland diseases, and in the diseased tissues, (in the pus of a tubercular abscess they may entirely elude discovery) that König<sup>1</sup> and Marchand<sup>2</sup> in such cases place but small diagnostic worth in this examination.

The question presents itself, whether the discovery of bacilli in the otorrhœa is so closely connected with the existence of a tubercular disease that we are justified in excluding the existence of a tuberculous affection by the absence of the bacilli, or whether the chronic tubercular middle-ear disease is, in this respect, to be classed with tuberculous bone diseases, etc.

Notwithstanding the limited literature on the subject, it may be said with some degree of probability, in answer to the above question, that in cases of otorrhœa, the diagnostic value of the bacilli is not very great.

The first positive communication on this point was by Eschle.<sup>3</sup> A man with advanced phthisis of the lung suffered from left-sided otorrhœa. In each one of twenty-five preparations were found bacilli in apparently moderate quantity (colored with fuchsin-anilin, and by mistake described as violet instead of red). His second case was a boy who shortly before had suffered from scarlatina, nephritis, and diphtheria, and presented a most anæmic appearance, though there was no demonstrable lung disease. After a month the perforation had healed, but there still persisted chronic otitis externa, the secretions of which contained bacilli.

Zucker<sup>4</sup> has called attention in his reference to Eschle's article, to the fact that this last case presented himself a short time afterward in Dr. Hartmann's Policlinic with total destruction of the membrane and no bacilli.

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<sup>1</sup> *Centralb. f. Chir.*, 1883, No. 22.

<sup>2</sup> *Deutsche med. Wochenschr.*, 1883, No. 15.

<sup>3</sup> *Deutsche med. Wochenschr.*, 1883, No. 30.

<sup>4</sup> *Centralb. f. Chir.*, 1883, No. 42.

Secondly, Voltolini<sup>1</sup> mentions, in a preliminary communication, that for some time he has watched and called attention to cases of otorrhœa, without any apparent cause, in which either a short time afterward a perhaps previously latent, lung phthisis followed, or the same ear affection, without any bone complications, supervenes on a beginning or already improving phthisis. In one such case he was able to discover bacilli, and hence the proof of the common cause of the two affections. A more-detailed account he reserves for another communication.

As opposed to these three positive cases, Gessler,<sup>2</sup> in an elaborate paper on the presence of bacilli in different localities, expresses himself thus: "That in the secretion of cases of phthisical otitis media purulenta, which he had examined at the request of Dr. Bezold, he had been unable to discover the bacilli, but his material was too small to allow him to form any positive conclusions."

Kanzler,<sup>3</sup> in a paper on the presence of bacilli in scrofulous local affections, says that in two cases of purulent middle-ear inflammation—one scrofulous and one tuberculous,—he was unable to prove the existence of the bacilli in the secretion of the diseased ears, although in the mucus of the inflamed larynx the bacilli were abundant.

In the Policlinic of Dr. Hartmann, a case is at present under observation, in which the lungs have been for years considerably affected. Recently a left-sided chronic purulent middle-ear inflammation has been added which, in spite of treatment, has resulted in great destruction. The examination of the sputum always revealed the tubercle-bacilli, but in the pus discharged from the ear they could never be found, although repeatedly looked for both in the pus which had collected in the external canal and that obtained after inflation.

Although only negative results were obtained by our examination of the discharge from other cases of obstinate otorrhœa in scrofulous children, and from a phthisical patient, we do not care to lay much stress on these,

<sup>1</sup> *Deutsche med. Wochenschr.*, 1884, No. 2.

<sup>2</sup> *Deutsche med. Wochenschr.*, 1883, No. 34.

<sup>3</sup> *Berl. klin. Wochenschr.*, 1884, Nos. 2 and 3.

because in these cases only one examination was undertaken, although where the sputum is suspected, even that may be of value. It will not be denied, however, that the above case, judged by its clinical aspect, compels us to accept a tubercular origin, as in the first of Eschle's cases, in spite of the fact that at one time the bacilli were present and at another they escaped observation. It is self-evident that in our case also the tubercle-bacilli were the cause of the disease. Whether they themselves were present in extremely small quantities, as in Schuchardt-Krause's cases, or whether the particular conditions of the locality prevented their discovery, is uncertain. It is possible that in a large collection of preparations we might be able to find a few rods. It is probable that a piece of mucous membrane removed from the dead body and examined would give positive knowledge. At all events, in the cases in which the clinical conditions predispose us to accept the theory of the tubercular origin of the disease, it must not be at once rejected because on repeated examination of the secretion the bacilli remain undiscovered. In estimating the practical value of the examination for tubercle-bacilli in the diagnosis of a tubercular ear disease, it must be remembered that these cases in which the examinations gave negative results, and in which the tubercular origin was not less well grounded, were opposed to the three well-known cases with their positive evidence of the presence of bacilli. Hence the examination of the secretion, in all suspected cases of chronic purulent middle-ear inflammation, for tubercle-bacilli is to be recommended. If, however, the result is negative, we are not justified in excluding a tubercular origin.



## ON THE CELLULAR STRUCTURES OF THE HUMAN ORGAN OF CORTI.

(ABRIDGED FROM A COMMUNICATION READ BEFORE THE NATURALISTS' CONVENTION AT FREIBURG, I. B., IN 1883.)

BY H. STEINBRÜGGE, HEIDELBERG.

Translated by H. F. HANSELL, M.D., Philadelphia.

(*With two wood-cuts.*)

N EARLY all histologists since Deiters have described the outer cells of Corti as long, cylindrical or cone-shaped formations, which, by means of a lower process, are attached to the lamina basilaris. Rosenberg, in a dissertation on the cochlea of the dog, which appeared in 1868, was the first to describe these cells as having a rounded lower end and no prolongations; and Retzius, in 1882, in an article on "The cochleæ of Rabbits," contained in his "Biological Examinations," concurred in this view. The speaker called attention to the fact that Hensen in the "Morphology of the Cochlea of Man and other Mammalia," published in 1863, had described the human cells of Corti as being spherical in shape, in contrast to the more oblong, seen in some of the lower animals; and mentioned that he had always found the outer cells of Corti in the human cochlea to be of smaller size and rounder form than they appeared in the illustrations in the histological text-books and monographs. They never showed an inferior prolongation; such may, however, be easily simulated, by the prolongations of Deiters's cells, as in their course to the lamina

reticularis to which they are attached alternately in the spaces between the outer cells of Corti, they pass closely to the outline of these and often appear to originate from them. In illustration of this condition, two preparations, among others, were exhibited, in which the outer cells were isolated and easily seen (see cuts). These cells are distinguished from the neighboring cellular structures *in natura*, by a stronger reflex, by a sharper contour, and occasionally by a darker color, and at times resemble a small ganglion cell. The spherical nucleus is often seen only through a high magnifying power. In the place of the minute ciliæ was observed generally only one rod-shaped prolongation which passed through the lamina. The other preparations

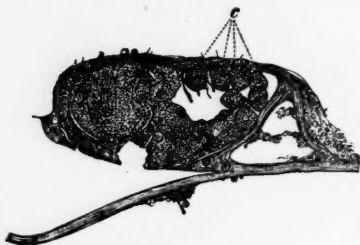


FIG. 1.



FIG. 2.

shown related to the inner cells of Corti, and the cells of Claudius and Hensen, but, having no drawings of them, I shall not notice them here.

#### *Explanation of the Cuts.*

The drawings purposely represent the preparations exactly as they are, including their defects and want of clearness. In so presenting them, we hope they will prove so much the more convincing. Any one accustomed to examine microscopically the human cochlea, will know, moreover, that regular and beautiful preparations of it are not to be obtained with the same facility, as they may be from the ears of animals. In order to be able to recognize pathological changes in the organ of Corti, a definite knowledge of the human ear is, however, absolutely necessary.

The drawings were made by Mr. C. Wittmaack, in Strassburg.

Fig. 1 (Hartn.  $\frac{3}{4}$ ) shows four of the outer cells lying one behind the other (*c*), the first of which (counted from within) probably belongs to a deeper row. On the other, there is seen a rod-like projection, which proceeds from the upper margin and pierces the lamina reticularis. To the outer side of the last two cells to the left, we see the torn processes of Deiters's cells. Only the upper part of these processes which is fastened to the lamina reticularis remain, and, as they lie closely to the cells of Corti, have the appearance of belonging to those cells. To the side and below lie a few cells of Corti belonging to another row, which have been displaced by the cutting of the preparation; they have no trace of a basilar process.

Fig. 2 represents the same; only the remnants of Deiters's cells are wanting; it shows especially well the round form of the second cell of Corti.

A CASE OF DOUBLE LABYRINTHINE DISEASE AFTER  
SCARLATINA ; FAVORABLY AFFECTED BY HYPO-  
DERMATIC INJECTIONS OF PILOCARPIN.

BY PROF. S. MOOS, OF HEIDELBERG.

Translated by Dr. J. A. SPALDING, Portland, Me.

*Nov. 22, 1881.*—I first saw S. H., æt. seven, in consultation with Dr. Gernet, of Carlsruhe. The little girl had been attacked late in the previous October with severe scarlatina, which was chiefly marked by a violent, probably diphtheritic, inflammation of the throat, accompanied with and followed by an extensive infiltration and suppuration of the glands ; on both sides of the neck an incision was necessary to relieve the suffering. At the height of the disease the temperature was  $40.6^{\circ}$  C. ( $105^{\circ}$  F.). There was never any loss of consciousness.

About a week after the fever began, pain was complained of in both ears, and followed by an abundant and exceedingly fetid discharge, which still persists. The hearing gradually decreased, and for the last few days before I saw the child, had been entirely lost.

Examination showed that the hearing was absolutely destroyed, both by ærial and bone-conduction. The child could not hear the loudest possible shout close to her ears. The discharge was as abundant as before, and each *Mt* exhibited a perforation embracing about one half of its extent. The mucous membrane of the tympanum was much swollen. The child, who was very bright, gave us to understand, upon questioning, that she was also suffering from very loud subjective sounds. As she became convalescent, the parents noticed that the child could not walk without tottering, so that at first it was very doubtful whether this condition was to be simply referred to muscular weakness, or to

be regarded as the symptom of an affection of the labyrinth. But later, judging from the well-marked disturbance of hearing, we concluded that the labyrinthine affection had in some way affected locomotion.

To relieve the suppuration from the ear, we advised the boracic-acid treatment, and in order to produce resorption of the exudation in the labyrinth, we suggested hypodermatic injections of

R	Pilocarpin. muriat.	. . . . .	0.02
	Aquæ destillatæ	. . . . .	2.00
M.	Signa: Ten drops to be injected once daily.		

At a later date, I suggested that the injection should be used only every other day.

*Nov. 30th.*—Dr. Gernet writes to me: "The pilocarpin injections were given daily as you directed, and well borne. I have not as yet been able to discover that they have produced any effect. The child heard a woman's voice in her left ear just *before* the first injection, but a man's voice could not be heard. Since then, however, the hearing has increased quite perceptibly, and yesterday the child insisted that she could hear a watch tick. Total deafness still continues in the right ear. In the left ear, however, the discharge had ceased up to yesterday, but to-day it has reappeared, and with it we discover a notable decrease in the hearing. Otherwise the little patient is quite well. The abscesses in the neck have entirely healed, and the appetite is excellent. The gait is, to be sure, somewhat unsteady, but in my opinion it depends more upon her general weakness than upon vertigo or dizziness. The patient, moreover, makes no complaint whatever of the latter symptoms; she thinks that she cannot hear so well with an ear-tube as without it."

After some correspondence we agreed to continue the pilocarpin treatment, though in double strength.

*Dec. 14th.*—Dr. Gernet writes to me: "I am very glad to inform you that the patient is progressing so favorably that she now begins to hear also with her right ear, which in the beginning of treatment was totally deaf. The hearing of the left ear has improved decidedly, yet the deafness is still well marked. The treatment was continued as you directed, and the pilocarpin injections increased to double the amount daily, without any disagreeable symptoms manifesting themselves. Perspiration was well marked on the face only in the beginning of the treatment, but now nothing of the sort is noticed. There have been

no symptoms of collapse. The child has daily instruction, and understands what her teacher says. She cannot walk well yet, although so much improved in health and strength. Within a day or two she has first attempted to walk alone. She does not stumble, but spreads her feet and legs apart like a sailor and throws her body well forward when she walks. There is still some discharge from the right ear, but it generally disappears for two or three days after a single insufflation of pulverized boracic acid. Subjective sensations of sound do not appear to be perceived; if perceived, they must be weak. Shall we still continue the hypodermatic injections of pilocarpin?"

We now decided to continue this method of treatment, but not so frequently as before.

*Dec. 26th.*—I saw the patient again. She can repeat what is said to her without looking at the speaker's mouth, but she hears better with the left ear than with the right. By aerial conduction, she can hear the A tuning-fork, but not by bone-conduction at 1 m. She hears a table-bell and clapping with the hands. The suppuration in the right ear still continues, and is more abundant than in the left. The edge of the perforation in the right ear is granulated, while in the left ear it is not yet even cicatrized. We agreed to try a ten-per-cent. solution of lead acetate in the right ear, and a three-per-cent. solution of silver nitrate in the left ear.

*Jan. 21, 1882.*—Dr. Gernet wrote to me that the child had not heard conversation so well as before during one or two previous weeks, but that the condition was at present about the same as when I had last examined the patient. The tuning-fork was not heard quite so long by a few seconds in the right ear as in the left. The watch was not heard on contact or by bone-conduction in the right ear, while with the left ear it was heard at 2 to 3 cm. distance. These amounts, however, varied on successive days. She could distinctly hear with the worse ear the clapping of hands and ringing of a bell, the length of the chamber. The granulations had disappeared, as well as the discharge, so that all medication for the ear had been discontinued for about a week. Unless Dr. G. had been deceived by scales in the meatus, the perforation in the *Mt* had decidedly decreased in size. As relapses of deafness recurred, the pilocarpin injections were again resorted to daily, and then every other day, although without producing any decided improvement.

*Feb. 22, 1882.*—The condition of the patient is as follows: The discharge has ceased in both ears, and the perforations in the *Mt* are reduced to a minimum. Hearing in the right ear is absent. The A tuning-fork can be heard by bone-conduction in the left ear when open; in the right ear only when closed. Low voice at 1 m., L. E.

*Aug. 1883.*—Dr. Gernet reports that the patient is capable of being educated, although rather a poor scholar. The parents think that the reason why the child makes so little progress is that she is lazy and does not try to study. The hearing, examined in a room  $3\frac{1}{2}$  m. long, gives the following results:

Whisper = 0 in both ears.

Moderately loud voice of a man is heard and understood at  $3\frac{1}{2}$  m. left ear, while with the right ear it is only heard as a noise.

With the left ear the child can distinguish a gentle clapping of the hands; with the right, only a violent clapping.

The sound of the bell is heard at about the same distance with both ears.

Watch, left 10 cm., right, 5 cm.

Snapping with the finger-nails, left ear, 2 m.; right ear, 1 m.

The tuning-fork, when struck loud enough to be heard for five seconds in the right ear, is heard in the left ear for ten seconds, and it does not appear to make much difference whether the fork is held on the calvarium or on the mastoid process.

*Nov. 1, 1883.*—I saw the patient once more, and was able to confirm the above statements, as well as the fact that both *Mt* had entirely cicatrized.

Politzer was the first aurist to recommend the use of hypodermatic injections of pilocarpin in fresh cases of syphilitic affections of the labyrinth.<sup>1</sup> Following his suggestion, I decided to employ the same remedy even when the case was not of a specific nature. Politzer injects from three to ten drops daily for ten or fifteen days of a solution containing pilocarpin, 0.04, aqua pura, 2.00. But as this was the first case in which I had used this powerful remedy, and as the patient was a child, I thought it best to be on the safe side, and consequently made the solution much

<sup>1</sup> *Compte rendu of the International Otological Congress, at Milan, 1880.* Compare, also, Politzer, "Ueber Ohrsyphilis," *Wien. med. Blätt.*, 1882, Nos. 30 and 31.

weaker. Perhaps a more concentrated preparation would have accomplished more good. Although it is apparently a fact that the hearing partially returned in the left ear on the morning *before* the first injection was made, yet the favorable action of the remedy upon the course of the aural affection cannot be denied. And even if the hearing which the patient regained was after all far less than normal, there can be no question that it is sufficient for an education, and enough to relieve the child permanently from the terrible condition of deaf-mutism. I likewise recommended the use of pilocarpin in a case of freshly acquired deaf-mutism after affections of the labyrinth in scarlet-fever, which I saw in consultation with Dr. Wolf, of Frankfort-on-the-Main, but unfortunately it was never used. It was used, however, with brilliant result in another case of total deafness after scarlet-fever.<sup>1</sup>

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<sup>1</sup> *Corresp.-Blatt f. Schweiz. Aerzte*, 1883.



## ACQUIRED ATRESIA OF BOTH AUDITORY PASSAGES DUE TO CHRONIC ECZEMA.

BY PROF. S. MOOS, OF HEIDELBERG.

Translated by DR. J. A. SPALDING, Portland, Me.

L. G., unmarried, æt. thirty-three, of normal menstruation, has suffered for eight years with eczema of the head and of both auricles, as well as of both upper and lower extremities, the latter most extensively. Three years ago, as she supposed, from an extension of the eczema into the auditory passages, the ears began to discharge. After a long time the discharge ceased spontaneously, but from that time onward the hearing has been much reduced. H: low voice, R E 1 m., L E 2 m. Watch R E  $\frac{3}{1000}$  L E  $\frac{5}{1000}$ . Tinnitus (roaring and hissing) is constant in both ears. Bone-conduction for the watch and tuning-fork is well preserved. Examination shows a funnel-shaped hole at the place usually occupied by the meatus in each ear, but the passage is entirely closed by a solid mass, so that a sound passed to the bottom of the cavity touches immediately upon hard bone.

It is probable that chronic periostitis of the osseous meatus was excited by the eczema at a time when the labyrinth was entirely unaffected. The patient did not put herself under treatment.

## A PECULIAR MALFORMATION OF THE RIGHT EAR, WITH AN INTACT LABYRINTH.

BY PROF. S. MOOS, OF HEIDELBERG.

Translated by J. A. SPALDING, M.D. Portland, Me.

L. H. æt. twenty, consulted me April 20, 1882, for the following anomaly of his right ear.

The middle portion of the auricle is folded forward over the region of the tragus, entirely concealing the latter. At the same time the edge of this folded portion of the auricle is united with the soft parts of the ear and those in front of the tragus in such a manner as to cause furrows above and below the parts so united. The whole external ear is somewhat smaller than on the left side.

The right auricle measures  $5\frac{1}{2}$  cm. high, the left  $6\frac{1}{2}$  cm. ; the right auricle is 2 cm. wide, the left  $3\frac{1}{2}$  cm. The right ear is deaf to speech, but a watch that ticks very faintly and all of my tuning-forks could be heard in his ear by bone-conduction. In spite of this I did not advise the patient to submit to an operation.

It is possible that the affected auricle was deformed by being caught in a loop of the umbilical cord.

The left ear was normal in form and function.

CARCINOMA OF THE CUTANEOUS-CARTILAGINOUS  
PORTION OF THE MEATUS, WITH PERFORATION  
OF THE AURICLE, EXTENSION OF THE GROWTH  
TO THE LOWER PORTION OF THE MASTOID  
PROCESS, AND PARALYSIS OF THE FACIAL  
NERVE.

BY PROF. S. MOOS, OF HEIDELBERG.

Translated by J. A. SPALDING, M.D., Portland, Me.

Madame G., æt. fifty-four ; November 9, 1877. She has been affected for six years with a discharge from the left ear, of which she has always been negligent. Since last June she has noticed a button-shaped swelling in the external meatus, which has gradually increased in size. She suffered from continuous burning pain in the tumor and had fever. In October, she first noticed paralysis of the same side of the face. Fourteen days before this, however, a tumor as large as a walnut had made its appearance behind the left auricle, and as it was regarded as an abscess of the mastoid process by the physician in attendance, he made a long incision throughout its entire extent.

I found the entrance of the meatus occluded by a tumor as large as a walnut, starting from the lower wall of the meatus, bleeding easily, and entirely hindering any deeper inspection of the parts. Behind it and in its base as it were, was a hole, involving chiefly the auricle, while extending backward and occupying about the entire lower third of the mastoid process, was a knobby tumor the size of a nut, offensive to the smell, covered with pus, and lying in direct connection with the tumor in the meatus.

The left half of the face was paralyzed ; water injected into the defects in the auricle escaped through the Eustachian tube, showing that the *Mt* also was perforated. With the exception of

a discharge from the ear no assignable cause for the carcinoma could be discovered.

The disease had probably crept along the lymphatics from the external meatus, through the auricle, and then behind the ear. From thence it had made its way to the facial nerve, just before its escape from the stylo-mastoid foramen, and destroyed it.

## TWO CASES OF CONDYLOMATA, AND ONE CASE OF PRIMARY SYPHILIS OF THE EX- TERNAL EAR.

BY DR. J. ZUCKER, OF BERLIN.

Translated by Dr. J. A. SPALDING, Portland, Maine.

VERY little has been published concerning the rare occurrence of syphilis upon the external ear or within the meatus, since the appearance of Stöhr's excellent paper.<sup>1</sup> For, wide as is the diversity of opinion concerning the frequency of this disease in the middle or inner ear,<sup>2</sup> almost all otologists agree in asserting the extreme rarity of syphilis upon the external ear.

If we examine the text-books of otology, we find that Politzer<sup>3</sup> and Urbantschitsch<sup>4</sup> make mention only of squamous, pustular, and papular exanthemata on the auricle, while the former refers to an observation by Burnett, of the appearance of specific nodules in the same locality. Politzer particularly speaks more in detail of condylomata in the auditory meatus, but remarks that they differ only in locality from those which are seen in other regions of the body, and rarely demand an extremely energetic treatment. Ulcers, with a whitish base and steep edges, are much more rarely observed in the meatus, and never, except in connection with syphilitic affections, of the

<sup>1</sup> *Archiv f. Ohrenheilkunde*, Band v.

<sup>2</sup> Roosa: these ARCHIVES, vol. viii., p. 336; and Sexton: *Transactions of the American Otolog. Soc.*, 1878.

<sup>3</sup> "Lehrbuch," p. 691.

<sup>4</sup> "Lehrbuch," p. 137.

middle ear. V. Troeltsch<sup>1</sup> mentions syphilis as a cause of otitis externa, and reminds us that condylomata, when cicatrizing, often produce circular contraction of the meatus. Moos<sup>2</sup> describes the differential diagnosis between the rod-shaped and overlapping proliferations of the condylomata, and polypi in the meatus which sometimes look like them. Hartmann<sup>3</sup> has never seen any thing but condylomata in the external meatus; while Schwartz,<sup>4</sup> in his excellent paper on syphilis of the ear, insists especially upon the appearance of ring-shaped ulcers with a dirty-white coating connected with excessive swelling of the lymphatic glands in the neighborhood of the ear. Wilde<sup>5</sup> reports a case in which the external meatus was entirely occluded by a number of condylomata, whilst Field<sup>6</sup> describes a similar one in which two thirds of the auricle were destroyed by ulceration, although it is impossible to tell from his description ("I diagnosed a syphilitic taint") whether the ulcer was a manifestation of primary or secondary syphilis. The most accurate valuation of the clinical symptoms, as well as of the treatment of condylomata of the auditory meatus, is to be found in Stöhr's paper already mentioned,<sup>7</sup> and it is a fact well worth noticing, that, in the relatively short space of three years, this author was fortunate in meeting with fourteen cases, while all other authors have observed but few cases. Thus, for example, Buck<sup>8</sup> has only seen in three quarters of one per cent. of all of his cases syphilitic diseases of the ear, and only five cases of syphilitic affections of the external ear, in four thousand patients. In two of these, there were syphilitic ulcerations of the auricle; in the third, the ulceration was discovered in the meatus; whilst in the two remaining cases, the meatus was entirely filled with syphilitic

<sup>1</sup> "Lehrbuch," 7th edition, pp. 116, 123, 132.

<sup>2</sup> *Klinik der Ohrenheilk.*, p. 287.

<sup>3</sup> "Lehrbuch," 1st edition, p. 79.

<sup>4</sup> *Archiv f. Ohrenheilk.*, Band iv., p. 254.

<sup>5</sup> "Practical Observations," etc., (American edition,) 1853, p. 202; quoted in these ARCHIVES, viii., p. 165.

<sup>6</sup> *British Med. Jour.*, Oct. 6, 1877.

<sup>7</sup> *Archiv f. Ohrenheilk.*, Band v., pp. 130-137.

<sup>8</sup> *American Journal of Otology*, 1879, p. 25.

granulations. Knapp<sup>1</sup> has seen syphilis of the auditory meatus but once in about ten thousand patients. On the contrary, Ravogli,<sup>2</sup> who examined one hundred and forty-four syphilitic patients, fifteen of whom had an affection of the middle ear (seventy-seven had suffered from numerous condylomata on other parts of the body), *never* saw a condyloma in the auditory meatus, and only once a nodular and hard eruption on the auricle and within the meatus, the origin of which he was inclined to attribute to syphilis in the nurse of the patient. Despres<sup>3</sup> examined twelve hundred syphilitic patients, and saw once—an *unique case*—a soft chancre, and five times broad condylomata in the meatus; and, besides these, “quite a number” on the auricle and in the hole which had been pierced for the ear-ring. Köbner<sup>4</sup> has also observed a single case of round papules, associated with condylomata in the opposite meatus, extending inward about half an inch from the auditory orifice.

I have carefully examined the journals of Dr. Hartmann's clinic for the last two years, during which period more than two thousand aural patients were treated, and I have discovered but one case of the formation of condylomata in the meatus. This case is as follows:

C. F., a mason, æt. twenty-seven, was first seen January 6, 1882. The patient became infected with syphilis two years before. The right ear had discharged previously, and had for a long time been deprived of hearing; the left ear was first attacked in the spring of 1881 with pain, followed by a discharge which, however, ceased in a month. Five weeks ago the patient had first perceived a feeling of fulness in his right ear, and had been obliged to use a hairpin “to make the air go into his ear.” Within a fortnight, pain and moderate secretion had again been noticed in this ear. The examination showed that both auditory passages were completely closed by swelling, the orifices surrounded with ulcerated tumors, which were separated from one another by deep

<sup>1</sup> These ARCHIVES, vol. viii., p. 165.

<sup>2</sup> *Compte rendu du Congr. Internat. d'Otol.* Milan, p. 129.

<sup>3</sup> *Annales des maladies de l'oreille et du larynx*, December, 1878.

<sup>4</sup> “Klinische Mittheilungen aus der Dermatologie und Syphilidologie,” Erlangen, 1878, p. 53.

furrows. The treatment consisted in repeated cauterization with silver nitrate in substance, after which the tumors rapidly diminished in size. The patient also submitted to a course of inunction, while later red precipitate salve was applied to the parts.

*Feb. 9th.*—The process has come to a stand-still.

*March 3d.*—The swelling can no longer be discovered, and the orifices of the auditory passages appear normal. The hearing in the left ear, although a perforation-whistle had been quite audible only a week before, is almost normal. Watch  $\frac{8.6}{100}$  cm. Whispered voice, seven paces.

The second case was apparently one of infection with a soft chancre, but as the patient was soon lost to sight, we could not of course state whether any other symptoms of general syphilitic infection ensued at a later date. Yet the condition in the ear bore great resemblance to the typical broad condyloma.

This patient appeared for treatment December 12, 1878. Ten weeks previously he had acquired a soft chancre which had been cured in six weeks. Fourteen days before the specific ulcer healed, he was attacked with pain in the right ear, which was followed by a discharge, both of which continued permanently up to the time of his first visit. Examination shows that the orifice of the external meatus of the right ear is entirely surrounded with a granular mass which bleeds even when but slightly touched. Many furrows are visible between the individual granulations. *We abstained from constitutional treatment*, and simply touched the whole mass with silver nitrate in substance, whereupon the swelling rapidly diminished and the pain ceased. Several cauterizations effected a perfect cure.

We have now seen that all of the cases hitherto reported have simply exhibited various forms of syphilis in the later stages of the disease, and that they corresponded generally to the stage of constitutional infection. I have never yet discovered, in all accessible otological literature, a single case of primary syphilis of the external ear. And even Mracek,<sup>1</sup> in his exhaustive report of over four hundred cases of the primary manifestation of syphilis outside of the genital tract, cites but three cases of primary syphilis of the external ear: one, reported by Hulot,<sup>2</sup> of a child with a chancre

<sup>1</sup> "Die syphilitische Primarsclerose ausserhalb der Genitalsphäre." *Wiener med. Presse*, 1880, No. 1.

<sup>2</sup> *Annales de dermatologie et de syphilogr.*, 1878.



on the mastoid process, which was attributed to infection by the nurse; a second of a chancre on the base of the tragus, the origin of which was problematical; and finally a case from his own practice, and related in profuse detail, of a chancre on the lower portion of the mastoid process, which appeared to have originated from the kiss of a prostitute. Pellizzari<sup>1</sup> also examined with great care forty-one cases of the transmission of syphilis without coitus, and found only one (*l. c.*, p. 58) in which the primary effect of this disease appeared in the form of one chancroid on the left cheek and a second on the lobe of the auricle of the same side. The origin of the chancre is not referred to the sleeping of father and son in the same bed, but to the mutual use of a handkerchief which the son had previously employed in washing his penis.

I have lately seen a case similar to the one reported by Mracek.

*July, 1883.*—Mr. X. consulted me for a painful swelling on his right ear, which had steadily increased in size despite a variety of treatment. Closer examination shows that the anterior wall of the cartilaginous meatus is bulging excessively inward and backward, the tragus of a livid red, twice as thick as the normal, while its anterior surface is covered with a darkly pigmented radiating cicatrix. The entire parotid region appears to have become involved in the process, for it is extensively swollen, and feels as hard as a board. Still it is not at all painful. Beneath the angle of the inferior maxillary bone we discover a bunch of separable yet indurated and enlarged lymphatic glands. The patient's hearing is but slightly diminished in acuteness. There is no secretion from the ear. The posterior wall of the cartilaginous and osseous meatus, as well as the *Mt* (easily visible) are normal. The recent appearance, on the surface of each hand, of three or four small, round, slightly scaly efflorescences facilitated the diagnosis of a primary syphilitic infection. On the rest of the body we could discover nothing except moderate swelling of the lymphatics of the neck and axilla. The inguinal glands were not swollen. The naso-pharynx was free from complications; the genitals intact. After some denials, the patient confessed

<sup>1</sup> "Della trasmissione accidentale della sifilide." Mailand, 1882.

that he had had intercourse ten weeks before, and that the woman in the excess of her fervor had kissed him in the most passionate manner "all over his ears." He was unable to state whether his ear had in any way been previously abraded. Four weeks later, while shaving, he noticed near the tragus an excoriation which, despite repeated use of ointments, gradually and steadily increased in size, began to suppurate, and caused him a great deal of mental irritation on account of the disfigurement which it produced. The eruption on the hands made its first appearance eight days before I saw him, that is to say, about eight weeks after the infection. A course of inunction produced a perfect and rapid cure.

## THE RESULTS OF THE EXAMINATION OF FOUR PETROUS BONES OF TWO DEAF-MUTES.\*

BY S. MOOS AND H. STEINBRÜGGE, OF HEIDELBERG.

(With three figures on Plate 1.)

Translated by WM. RANKIN, JR., M.D., Newark.

### FIRST DEAF-MUTE. (KARNATZ.)

**A**GE: End of the fiftieth year. It is uncertain whether he suffered from a congenital or an acquired deaf-mutism. Death from pulmonary and peritoneal tuberculosis. Chronic lepto-meningitis of the convexity.

*Larynx*: Anterior part of the thyroid and cricoid cartilages ossified. On the right true vocal cord a brownish-black, bloody, infiltrated spot. (Ulceration?)

Inspissated cerumen in both auditory canals.

*Nasal cavity*: Normal, except a slight bending of the septum toward the right, and a spine on the right side of it. The mucous membrane on the posterior wall of the pharynx somewhat hyperæmic.

*Mouths of the tubes*: Hook-shaped fold, posterior lip and fold, Rosenmüller's fossa, well developed. The latter and the mouths of the tubes contain some mucus. The right cartilaginous tube appears normal upon dissection.

### *Right external and middle ear.*

Right membrana tympani perforated to a great extent posteriorly (wearing through of the plug of cerumen?).

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\* We are indebted to Dr. E. Fränkel, Pathologist, of Hamburg, for the petrous bones, as well as the notes of the histories and autopsies.

The remainder firmly drawn in; bound by fine adhesions to the promontory. Adhesions in the neighborhood of the tendon of the tensor and the stapes. Roof of the tympanic cavity very thick, mucous membrane of the tympanic cavity somewhat opaque, not thickened. Ossicles well formed, movable. The vertical diameter of the tympanic cavity shortened by a bladder-shaped enlargement of the fossa jugularis projecting from above. By its highest point, which is transparent, the entrance to the round window is transformed to a fissure. The longitudinal diameter of the fossa jugularis measures 12 mm., the transverse diameter 9 mm. Osseous tube and tympanic mouth of the tube narrow, but otherwise normal.

*Left external and middle ear.*

Roof of the tympanic cavity likewise very thick. Membrana tympani perforated in the anterior half. Tympanic cavity filled with a mucous exudation composed of granular cells, free fat, and amorphous black pigment. Mucous membrane of the tympanic cavity thickened, especially over the promontory, and traversed by a thick network of vessels. The vessels examined microscopically appear enlarged and bulb-shaped. Adhesions in the niche of the round window. Ossicles well formed. On this side, the floor of the tympanic cavity is also thin, and stands remarkably high, so that in a vertical incision through the promontory, the floor of the scala tympani of the first cochlear convolution comes in a line with the floor of the tympanic cavity. Symphysis of the stapes with the vestibule normal. The microscopical examination of a membrana tympani (right) yields negative results, whereas both tensor tympani contain only few muscular fibres, those present, however, appearing normal. Between them are abundant connective tissue and very numerous large fat globules, which contain, besides pigment, bunches of margarin. In the niche of the round window, adhesions and purulent secretion.

*Result of the microscopical examination of the right labyrinth.<sup>1</sup>*

Both nerves in the internal auditory canal normal. In

<sup>1</sup>All four petrous bones were treated seventy-two hours in a one per-cent. solution of osmic acid, and decalcified according to the method previously described.

the neurilemma of the acusticus, isolated black-colored globules, probably fat colored by osmium.

On the further examination of sections taken from various parts, the bony structure of the entire labyrinth appeared normal. The chief nerve tracts proceeding to the separate structures of the labyrinth also appear normal, whereas the nerves are deficient in the first and second convolutions of the cochlea from Rosenthal's canal and also a large part of the ganglion cells in Rosenthal's canal itself (see plate, figs. 1 and 2, for the similar condition on the left side), while from the centre to this place, the entrance of nerve fibres could be demonstrated (see fig. 2 for the other side).

The labyrinth was very vascular in every part. Numerous connective-tissue adhesions appeared in the scala tympani of the second and third convolutions. Everywhere the organ of Corti and the membrana tectoria were wanting, while Reissner's membrane was preserved but collapsed.

We found peculiar bodies in the utriculus, the same in epithelium of the nerves, also on the posterior wall and also on the inner surface of the horizontal and sagittal ampulæ, likewise in the well-preserved ligamentum spirale of the second and third convolutions of the cochlea. These bodies had partly a round, partly a pear and club-shaped appearance, were either of double contour or in concentric layers. The test with malachite green as well as the iodine-sulphuric acid reaction gave a negative result, so that unless the long continued treatment of the preparation with chromic acid prevented the amyloid reaction, it is probable that we had here the extensive occurrence of colloid or hyaline bodies.

*Results of the microscopical examination of the left labyrinth.*

Trunk of the acoustic and facial nerves in the inner auditory canal normal.<sup>1</sup> In the cochlea, as on the right side, the nerve-fibres within the lamina spiralis ossea of the entire convolutions to the ganglion layer in Rosenthal's canal are wanting (see *l. o.* fig. 1). In the central part of the ganglion zone appears a defect caused by atrophy of the

<sup>1</sup> On the posterior upper wall of the tympanic cavity a defect of the fallopian canal was visible where the nerve with a part of its superficies freely projected.

ganglions (see *c. R.* fig. 2). On the periphery of this defect, ganglion cells were found only scantily and for the most part wasted, only slightly granulated but containing distinct nuclei. Examined by a low power the interior of the scala appears for the most part filled with a granular appearing mass, which under a higher power seemed to be composed of large and small, round, strongly granulated ganglions and cells and scanty otoliths (see fig. 1). The whole mass is held in *situ* by coagulated lymph.

Huschke's teeth, the cords of the zona pectinata as well as the vas spirale were still present unaltered; Corti's and Reissner's membranes were also unaltered, but still visible only in isolated parts of the convolutions and Corti's membrane was somewhat thickened in parts.

Of Corti's organ (see fig. 3) a large part of the cellular elements, their protoplasma as well as their nuclei, were of a deep black color (broken-down fatty products colored black by osmium). The arches of Corti are not visible; the whole structure consists of an aggregate of variously formed cells on which only a few supporting cells are still clearly to be seen (see fig. 3, left and outward).

The epithelium of the nerve is entirely wanting in the sacculus, as also the afferent nerves; it is preserved on both in the utriculus. On its anterior wall, as in the right utriculus, are numerous colloid bodies of a yellowish green appearance (effect of the chromic acid). In the ampullæ are many black colored granules and clusters of granular cells, products of the fat metamorphosis, colored by osmium.

#### SECOND DEAF-MUTE, THIRTY YEARS OLD.

On the preparation, which was removed according to Schalle's method, irregularities in the structure of the cranial and facial bones appear, inasmuch as the petrous bones are small, delicately formed, and slender, while the bony palate is hyperostotic. The nasal septum is prominent through a bending toward the right, whereby a concavity arises in the left nostril. The ledge-like prominence runs horizontal on the convexity of the bend of the septum, and touches the inferior turbinated bone. In the right maxillary sinus, a cyst with honey-like contents.

In the pharyngeal space the mouths of both tubes are narrow, as, for instance, the right measures in the vertical diameter 7 mm.; in the horizontal diameter, only 3 mm.

*Right petrous bone.*

Interior of the cartilaginous tube narrow. Membrana tympani drawn in, hyperæmic, with diffuse calcareous infiltrations; short process visible; handle of the malleus not. Mastoid process small and sclerosed. Ossicles very delicate, of normal formation, and movable. Adhesions stretch from the head of the malleus, as well as from the neck, to the point of insertion of the short process of the incus. Osseous tube and its tympanic mouth narrow. Processus cochleariformis strongly developed. Digital impressions very deep, and separated from the carotid only by a very thin plate of bone. Near this point the carotid lies exposed, and is enlarged in its diameter to 6 mm., while the canal at its entrance and exit measures only 4 mm. Fossa jugularis in the longitudinal diameter 12 mm.; in the transverse diameter, 11 mm. In the inner auditory canal nothing abnormal.

*Left petrous bone.*

The fossa for the Gasserian ganglion is certainly deep, but a dehiscence is not present, as on the other side. Mastoid process small and sclerosed; roof of the tympanic cavity tolerably thick. Ossicles as in the right, but covered by a thickened mucous membrane. Pseudo-ligaments round about the tendon of the tensor and the crus of the stapes. Mucous membrane of the membrana tympani is opaque. Nothing peculiar about the tube. Fossa jugularis smaller than the right, especially in the transverse diameter.

*Microscopical examination of the structures of the middle ear.*

The tensors of both membrana tympani contain only a few muscular fibres. They are composed principally of connective tissue and fat. The left tube shows partial calcification and transformation of the hyaline cartilage into fibrocartilage. One sees groups of cartilage cells with irregular angular nuclei which remind one of bone corpuscles, and fibres proceeding from these cell groups like the spokes of a

wheel interlace and cross with the fibres of neighboring cell territories. Levator veli strongly developed. Only a few fibres of the tensor veli could be discovered (perhaps in consequence of awkward preparation on our part). Toward the ostium pharyngeum the cartilaginous hook appears very small and recedes in transverse sections, while the median cartilage is broad and strongly developed, and is moreover in a lateral direction even on the floor of the canal more strongly bent over than on the upper, as is not unfrequently observed.

*Microscopical examination of the left labyrinth.*

Cochlea: Immediately behind the round window in the scala tympani are found bony adhesions of the lamina spiralis ossea, with the wall of the scala lying opposite, while the membrane of the round window is itself preserved intact. Further upward in the scala tympani of the first convolution are found only connective-tissue adhesions; further, in the ductus cochlearis heaps of round nuclei and cells, for the most part colored black (cheesy masses colored by osmium) and held together by coagulated lymph. In the entire first cochlear convolution the nerves within the lamina spiralis ossea are wanting, while the ganglions in Rosenthal's canal are partly present. Further upward the adhesions of the scala tympani decrease, the scala vestibuli becomes smaller and appears compressed from before backward. The nerves lying between the centre and Rosenthal's canal are preserved.

In the second convolution some nerve fibres are visible inside the lamina spiralis ossea, and the ganglion cells in Rosenthal's canal are present in greater numbers.

Reissner's membrane exhibits for the most part many curves. The basilar membrane is everywhere broken, the membrane of Corti is preserved here and there.

In the sacculus, similar conglomerations of cells as in the ductus cochlearis. Utriculus united by connective-tissue adhesions to the base of the stapes, its ligaments of attachment thickened by connective-tissue neoplasm. The nerve epithelium of the macula absent; in its place are found globular and club-shaped hyaline bodies. On some of the



preparations these bodies do not lie free upon the macula but are covered by a thin investing membrane, and moreover, appear isolated and encapsulated by partition walls. These bodies are found on other points of the walls of the utriculus, also between the hypertrophied ligaments of attachment. The nerves of the utriculus itself are preserved.

In the frontal ampulla is found a portion of the cupula terminalis which is also present in the horizontal ampulla.

*Right labyrinth.*

In the preparation, the acoustic and facial nerves had been already removed from the internal auditory canal. In the niche of the round window numerous adhesions, its membrane bent convexedly toward the tympanic cavity. In the mucous membrane of the niche of the round window, clusters of cells with large nuclei, extending almost to the periphery.

Vestibule very small. In the epithelium of the utriculus the same hyaline bodies as in the right. In one of the semicircular canals, greenish colored round bodies (inorganic). The same are also found in the horizontal and frontal ampullæ.

The condition in the right cochlea conforms entirely with that in the left cochlea, with the exception of the osseous and connective-tissue neoplasms in the first part of the first convolution. For that reason we abstain from a detailed description.

*Critical remarks on the conditions in all four petrous bones.*

The following conditions of the labyrinth are common to all :

1. The absence of the nerves in the lamina spiralis ossea in all first cochlear convolutions (yet some nerve fibres remain in the superior convolutions in both petrous bones of the second case, as were described).
2. The stuntedness and atrophy of the ganglion cells within Rosenthal's canals.
3. The imperfect development and fatty degeneration of the organs of Corti.

4. The filling up of the ductus cochlearis in the one case, and the scala vestibuli in the other case, with cheesy masses which were intimately combined with coagulated lymph.

5. The occurrence of hyaline masses in different points of the membranous labyrinth.

As special conditions may be mentioned, the connective tissue and osseous adhesions in the scala tympani of the first part of the first cochlear convolution in the left labyrinth of the second case, and the absence of the nerve epithelium and the nerves in the left sacculus in the first case. These conditions, as also the presence of thickened cheesy masses in the scala and the hyperplastic condition of the ligaments of attachment of the utriculus, are certainly to be regarded as the sequelæ of an early inflammation in the entire labyrinth; and the hyaline bodies as products of degeneration of the cellular structures previously destroyed by inflammatory processes. But whether this early disturbance began during intra-uterine life or a short time after birth must remain undecided. Both views can be sustained by some of the conditions described. In support of an intra-uterine disturbance speaks the peculiar condition of the organs of Corti in the first deaf-mute (see fig. 3), which, with regard to its configuration as to the condition of its cellular structures, makes an arrest of development in an earlier stage, seem probable (great resemblance to the so-called small epithelial eminence), while in all other respects in both cases the normal development of the separate regions of the labyrinth and the structures favor the assumption of its origin shortly after birth.

Also in regard to the atrophy of the nerves in the cochlea and the atrophy of the ganglion cells in Rosenthal's canal there may be different opinions as to whether the conditions are to be considered the sequelæ of an inflammatory action or an atrophy from inactivity continuing for ten years. At all events it is very remarkable that the nerve-trunks and their branches up to Rosenthal's canal had not taken part in the atrophy. This condition speaks for the already recognized fact, that a nerve as long as it is in con-

nection with its central part will not suffer from a total atrophy, providing that no pathological changes from other causes have taken place in the centre itself.

As regards the utilization of these anatomical conditions for the functional examination of deaf-mutes, it would in our cases probably have led to the result that they heard either none at all or at least very few musical tones.

*Explanation of the Figures.*

FIG. 1.—The half of a section through the first cochlear convolution, left (from Karnatz) Hartnack  $\frac{3}{4}$ . In the clear space between the layers of the lamina spiralis ossea (*l. o.*) the nerve is wanting. The greater part of the scala vestibuli is (by a low magnifying power) filled with a granular appearing mass, which under a higher power appears composed of small and large, round, strongly granulated nuclei and cells. The whole mass is held together by coagulated lymph, in which here and there enclosed otoliths appear. The ligamentum spirale terminates at *l. sp.*, projecting also remarkably far inwardly.

FIG. 2.—A section through the entire first cochlear convolution, left (from Karnatz) Hartnack  $\frac{3}{4}$ . At *n* one sees the cut off end of the acoustic nerve passing off in a central direction; at *c R* a defect caused by atrophy of the ganglion layer in Rosenthal's canal. Toward the canal of the lamina spiralis ossea and in it the nerves are again wanting. The ligamentum spirale as in fig. 1. On the wall of both scalæ a thin border of coagulated lymph.

FIG. 3.—A vertical section through the organ of Corti of the first cochlear convolution of the left side of the same deaf-mute. Hartnack  $\frac{3}{10}$  imm. In a great part of the cellular elements both the protoplasm and the nuclei have a deep black appearance (in consequence of the influence of the osmic acid on broken-down fatty products). The arches of Corti are not visible, the whole structure consists only of an aggregate of variously formed cells upon which toward the outer part (left) some supporting cells are still clearly to be recognized.

ON THE COMPARATIVE DIAGNOSTIC VALUE  
OF AËRIAL AND BONE-CONDUCTION, AND  
OF QUANTITATIVE VARIATIONS IN THE  
PERCEPTION OF HIGH AND LOW TONES.

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Translated by J. A. SPALDING, M.D., Portland, Me.

WE are still looking about us in vain for a moderately accurate differential diagnosis between the so-called sclerosis of the middle ear and nervous deafness,<sup>1</sup> or, in other words, for some means for satisfactorily determining the extent to which the sound-conducting and sound-perceiving apparatus are affected in various cases. For this reason I need not offer any especial excuse for publishing in these ARCHIVES my personal experience in this direction, or for offering various critical remarks upon the present state of these important questions to which Lucæ, Dennert, and Jacobson have of late drawn the attention of the profession.

At the same time, however, I would remark that on the whole I shall keep in mind only such cases as those in which, as is usual in sclerosis of the middle ear, the affection is bilateral, for in unilateral diseases the impossibility of eliminating the hearing of the healthy ear seriously interferes with the accuracy of all tests with the T.-F.,<sup>2</sup> nor will

<sup>1</sup> Lucæ makes use of this term because it is at present so difficult or almost impossible to diagnosticate labyrinthine deafness from that which is due to an affection of the auditory nerves or of their cerebral centres.

<sup>2</sup> T.-F. in the following pages stands for tuning-fork; A.-C., for air-conduction; B.-C., for bone-conduction.

I especially discuss the value of Weber's experiment,<sup>1</sup> i. e., unilateral intensification of B.-C.

### I.

I have for several years tested the relation of B.-C. to A.-C. somewhat after the fashion of Rinne's experiment, by applying large tuning-forks furnished with clamps directly to the mastoid process and then holding them just opposite the orifice of the meatus, without, however, allowing them to touch the auricle. This method has proved of practical diagnostic value in my hands, and to it I attribute quite as much, if not more, importance than to quantitative variations, in the perception of high and low tones.

Unfortunately, we are not yet able to explain what actually happens in B.-C., and from this fact arises the extreme variety of opinion concerning its diagnostic value. But even if we cannot at this moment explain precisely how the molecular vibrations advance along the bones and excite the auditory nerve, *clinical experience compels us to assume that other causes come into play in B.-C. than in A.-C.; that B.-C. is entirely different from A.-C.; and, finally, that in the process of B.-C. the waves of sound which are given off from the bones of the cranium to the air in the auditory meatus and conducted in the usual way through the Mt (by vibrations as a whole) do not play (as Helmholtz has asserted) the chief rôle.* If this be not as I assert, how, then, can we explain (leaving aside those pure cases of synostosis of the stapes, of which, however, so far as concerns the subject now lying before us, very few accurate observations have yet been made)—how, then, I say, can we otherwise explain those numerous cases in which, with bilateral immovable fixation (or dislocation) of the handle of the hammer or of the other ossicles, the tuning-fork cannot be heard by A.-C., even when held as close as possible to the orifice of the meatus without touching, while, on the contrary, the same fork can be distinctly heard by B.-C.? To say nothing of the fact that under these circumstances we cannot speak of vibrations as

<sup>1</sup> Although Politzer ("Lehrbuch," p. 785) lays greater stress upon this experiment than upon Rinne's, I regret to say that I cannot agree with his opinion.

a whole,<sup>1</sup> it would also be difficult for us to comprehend how a fractional part of the vibrations, which in B.-C. are given off to the air of the meatus and to the *Mt*, could excite the auditory nerve into functional activity, while the vibrating T.-F., held directly in front of the orifice of the meatus, but without touching the auricle, could not accomplish the same, despite the larger number of vibrations.

The following observation by Wolfe<sup>2</sup> also proves that in B.-C. the auditory nerve is not excited in the usual way by vibrations of the *Mt* and of the ossicles as a whole.

In a case of complete unilateral obstruction of the Eustachian tube by a musket-ball, with excessive concavity of the *Mt*, *the forks middle c and a' were faintly heard, but heard a fifth higher by A.-C. when held directly in front of the orifice of the meatus, while by B.-C. their tones were heard much more distinctly but not raised in pitch at all.* Wolfe explains the elevation in pitch by increased tension of the *Mt*, for, according to his experiments,<sup>3</sup> tones passing through a membrane undergo an elevation in pitch when the tension of the membrane is increased.

Lucaë also<sup>4</sup> long ago described the post-mortem condition in a very interesting case of unilateral malformation of the ear, in which, upon the affected side, there was neither external nor middle ear, neither round nor oval window, while in the labyrinth the cochlea and semicircular canals as a whole were completely developed and normal; the scala tympani ended blind in solid bone. Now it was notorious that this patient could not hear a bell (*a'*) or a T.-F. in the malformed ear unless either the one or the other absolutely grazed the side of the skull, while by B.-C. both the bell and various forks could be heard distinctly though not quite so loud as in the other (normal) ear.

It is unfortunate with so interesting a case as this before us, that we feel obliged to remark, that in these experi-

<sup>1</sup> If we coincide with Voltolini and rely upon the assistance of the round window, and assign an opposite direction to the waves of sound, this would, as Politzer has already shown, presuppose an exit at the oval window, without which it would be impossible to believe in the vibration of the labyrinthine fluid as a whole.

<sup>2</sup> These ARCHIVES, vol. ii., part 2, p. 61.

<sup>3</sup> "Sprache und Ohr," page 196, and these ARCHIVES, vol. ii., part 2, page 67.

<sup>4</sup> Virchow's Archiv, Band xxix., page 62.

ments with B.-C., the associated action of the healthy ear could not be accurately nor totally excluded.

*I agree with Lucae in attributing the intensification of bone-conduction in diseases of the external and middle ear to the pathological resonance in the ear rather than to an obstruction to the escape of the vibrations. And to the reasons which he proposes in opposition to the latter theory<sup>1</sup> I would add still others based upon my own clinical experience: (1) That in those cases in which B.-C. is pathologically intensified, we generally notice that the tone is altered and has a metallic tint. If, for example, I fill my ear with water and tap with my fingers against the bones of the head, the tone sounds metallic, and as if I had struck a tightly stretched drumhead. (2) I have found in pure sclerosis of the middle ear, and despite an extreme degree of obstruction to the usual conduction of sound as well as to its escape, that the intensification of B.-C. is less marked than in most of the other affections of the external and middle ear, and still less marked than in acute inflammations of these parts, or in cases of polypi, plugs of cerumen, collections of exudation in the meatus or in the tympanum, etc.; and yet the explanation of this fact is easy, for in all of these last-mentioned diseases or cases, the opportunities for resonance are much more favorable than in any given case of simple sclerosis of the middle ear.*

Our ears were calculated for aerial waves of sound, and for this variety of transmission, resonance is, so far as possible, entirely eliminated. But the conditions of resonance would be of quite a different sort, if, as happens in B.-C., the bony walls of the middle ear and of the meatus vibrated also. Unfortunately we live at present in a state of profound ignorance on all these points, nor do we know any thing definite concerning the part, if any, which the Eustachian tube plays in the physiological resonance of the human ear. At the Otological Congress in London<sup>2</sup> Fourrier defended the theory that the function of the Eustachian tube was to convert the closed tympanum into an open

<sup>1</sup> "Die Schallleitung durch die Kopfknochen," 1870; also *Archiv f. Ohrenhlkde*, Band xix., page 73.

<sup>2</sup> *Archiv f. Ohrenhlkde*, Band xix., page 76.

cavity, in order to reduce to a minimum a resonance which could not be reconciled with normal hearing. Physiologically the tube is only temporarily closed during the act of swallowing, when speaking certain tones, or during the act of singing. Lucaë also long since asserted that the waves of sound escape through the tube into the pharynx. Yet, in opposition to such a view, we may here call attention to the experiments of Mach and Kessel, which prove (to say nothing of autophony observed when the tube is open) that a simultaneous conduction of the waves of sound from the tube and from the auditory meatus would greatly weaken the usefulness of the *Mt.* The future alone can tell how far these dissimilar views can become reconciled, but we already know that the Eustachian tube opens like a valve much more easily from the tympanum to the pharynx than inversely (Hartmann). Observations upon myself and others incline me to side with those who fear that complete closure of the tympanum would produce a disturbing resonance—disturbing to B.-C. at least,—and I do not think that the essence of the whole affair has been by any means sufficiently defined by asserting that the tube is generally closed. Thus, I was lately able to make the self-observation that, while walking out one day at a time when I was affected with a nasal catarrh, with a moderate degree of swelling of the right tube, the rolling of the horse-cars, even when at a distance, produced in my ear an unusual, dull noise, much louder than ordinary. As my aerial conduction and hearing distance did not appear in any way impaired, it was plain that the vibrations conducted directly to my body along the (then frozen) ground, had, in connection with an occluded Eustachian tube, produced an unwonted resonance in one ear. I could not doubt that the tube was partly occluded, because there were no foreign substances in the meatus, while on the contrary I felt in the tube a sense of fulness, and at the same time the results of the air douche were unsatisfactory, and Valsalva's experiment was imperfectly performed. I will add, moreover, that after careful use of an appropriate gargle and the insufflation of a one third of one-per-cent. zinc solution through



the catheter into the tube, the train of symptoms just mentioned disappeared in a day or two. I will additionally remark that at times when I perceive the occluded and sticky sensation in the ear, the mere act of touching the temple or auricle of the affected side produces a different and a more resonating tone than that upon the healthy side, and that at that time I likewise hear a deep humming noise, which is evidently a muscular or circulatory noise, rendered audible by resonance.

Considering the great importance of Hensen's "Physiology of Hearing" for practical physicians, I should like at this place to offer a few remarks on the manner in which he represents cranio-tympanic conduction with which I regret to say I cannot quite agree. Hensen, as is well known, supports Helmholtz's assertion that even in B.-C. the usual method of the conduction of sound still plays the chief rôle. To this I must say that we have no right to find fault with the physiologist when he strives with all his might against the opinion that the terminal apparatus of the auditory nerve is excited not only by vibrations of the *Mt* and ossicles as a whole, but additionally by the molecular vibrations of the fluid within the labyrinth. Nevertheless, clinical observations speak plainly enough, and when Hensen asserts that "we have not yet discovered how far a direct B.-C. produces a sensation of hearing," he must be referring simply to the precise method in which B.-C. takes place, for the fact itself is acknowledged universally by all eminent otologists. And when he further says that "many observers in years gone by endeavored to explain the peculiar fact that the tuning-fork is so well heard through the bones of the head, by assuming a direct conduction of the sound from the bones to the labyrinth—but such an opinion as this cannot be maintained." And again, when he refers to this same point, and endeavors to call to his aid not only Rinne and Lucæ, but Politzer himself,<sup>1</sup> "who" as he says "has distinctly demonstrated that the tone does not pass directly from the cranial bones to the petrous bone, but in a roundabout manner through the *Mt*, the ossicles, and the oval window," the reader might think that Politzer denied the possibility of B.-C. This, however, is not at all so, for in the very paper just quoted, as well as in his "Handbook of Otology," Politzer expresses himself quite unreservedly and un-

<sup>1</sup> *Archiv f. Ohrenheilkde*, Band i., page 318; a paper which, we may remark, though written twenty years ago, is still worthy of careful perusal.

equivocally in favor of a direct B.-C. Thus, for instance, in the paper which Hensen quotes, Politzer, after speaking of aërial conduction, continues (page 320): "But bone-conduction transmits to the labyrinth those waves of sound which originate from the movement of various molecules against one another (direct conduction to the labyrinth), as well as from the vibrations of whole masses (*Mt* and ossicles of the ear). It is in this way that we are to look at the view expressed by Bonafont, that the waves of sound reach the labyrinth in a decidedly modified form, depending upon whether they have been conducted to that part of the organ of hearing by the *Mt* and ossicles, or simply by the firm parts of the head. This view is also confirmed by experience." Further on (page 350), Politzer expresses the opinion that "in cases of synostosis of the stapes, the molecular vibrations of sound which are conducted directly to the labyrinth through the medium of the bones escape also toward the round window." Yet on this latter point we have no precise knowledge. The case just cited from Lucae, appears to prove, however, that this is not absolutely necessary.

The following remarkable passage in Hensen's work (page 26) ought to be revised at once. "When we can no longer hear a tuning-fork held close to the ear, the tone again becomes audible (we are speaking of the normal ear) when we place the handle of the fork against the teeth." Yet we know that this is directly contrary to every-day observation.

*Since A.-C. in normal ears is always more powerful than B.-C., so that a T.-F. is heard longer and louder by the air than when applied to the mastoid process; and further, since in pure disease of the external and middle ear, in so far as the deafness has reached a certain degree,<sup>1</sup> B.-C. is more powerful than A.-C.; and finally, since it does not appear probable, either from theoretical considerations or practical observations, that pathological processes in the labyrinth or additionally in the auditory nerve could possibly increase B.-C., I think that I am invariably justified in concluding from an unequivocal preponderance of B.-C. over A.-C., that the sound-conducting apparatus has been subjected to some disturbance which by resonance or by obstructed exit of the waves of sound favors B.-C. at the expense of A.-C.*

If there were any foundation for the reply which Jacobson makes to Dennert,<sup>2</sup> that "conversely, an affection of the sound-

<sup>1</sup> In slight degrees of disturbances of hearing, the cause which is supposed to intensify B.-C. may be so insignificant that it does not excite a distinct preponderance of B.-C. over A.-C.

<sup>2</sup> *Archiv f. Ohrenhklde*, Band xix., p. 48.

conducting apparatus might diminish the cranio-tympanic conduction of sound," the diagnostic value of B.-C. would suffer a grievous shock. But fortunately neither theory nor clinical experience compel us to believe in such an opinion, which Jacobson also, without being able to support with any positive evidence, can only verify by our lack of knowledge of the processes which take place during B.-C. in normal and pathological conditions. He confesses, however, that "in a vast majority of affections of the sound-conducting apparatus, the tuning-fork is heard much more loudly by B.-C. than in the normal condition."

Fully justified as the above conclusion appears, yet I gladly grant that there are difficulties in the way of availing ourselves of the same in the diagnosis of different diseases of the ear,—difficulties which can only be overcome by continued observation and, particularly, by post-mortem examinations. Amongst these are:

a. If the cases which applied to us for advice were simply those of pure diseases either of the sound-conducting or sound-perceiving parts of the ear, the affair would be simple enough, for I do not doubt that we, *e. g.*, in (bilateral) pure synostosis of the stapes, should always find a preponderance of B.-C., while on the contrary, A.-C. would preponderate in a case of purely nervous deafness. *But the first, and perhaps the chief difficulty of all, lies in this essential fact, that in practice we meet most frequently with mixed affections, so that the chief, if, indeed, not the only, question to investigate, is the relation in such mixed cases between A.-C. and B.-C., according to the variety and the degree of the affection then and there present.* This question, we must acknowledge, is one which has hitherto been sadly neglected, and which, as I think, can only be perfectly solved by the post-mortem examination of numerous cases which had been carefully examined during life. But inasmuch as we shall be forced from the very nature of the subject to wait yet a long time for such an agreeable fulfilment of our wishes, I shall simply content myself at present by making a few general remarks.

*We must first ask ourselves whether, in cases of nervous deafness, the expected preponderance of A.-C. can be transformed by the simultaneous presence of anomalies of the sound-*

*conducting apparatus (e. g., by a plug of cerumen) into a preponderance of B.-C., and inversely.* I believe that this question must be answered affirmatively or negatively, depending on the form and the degree of the existing affection. Any thing more accurate than this, has yet to be established. It is indeed well known that every affection of the external and middle ear does not equally cause B.-C. to preponderate over A.-C. (an occluding plug of cerumen, *e. g.*, causes more marked preponderance of B.-C. than a simple middle-ear sclerosis), and I believe that in slight nervous affections B.-C. may be made to preponderate over A.-C. by simultaneous occlusion of the meatus. But on the other side, *my own observations teach me to assert that in an affection of the sound-conducting apparatus (e. g., middle-ear catarrh) the expected preponderance of B.-C. over A.-C. can be weakened or even reduced to a minimum by a simultaneous affection on the part of the labyrinth, or, more generally speaking, of the perceptive apparatus.*

This is seen in the following case :

A lawyer, æt. twenty-four, with musical proclivities, consulted me for excessive deafness which had gradually grown upon him in the course of years, but more noticeably in the last few months. The affection was referred by the patient to an attack of measles, from which he had suffered twelve years before. He and his father are both afflicted with a chronic nasal catarrh. The patient has observed that he occasionally hears much better for a while (for fifteen minutes to half an hour at the most), with a feeling as if the ear "were opened" as the hearing improved (tubal symptom?). Pain, vertigo, annoying tinnitus have never been perceived.

Examination shows: both *Mtt* opaque, with increased concavity; tubes somewhat constricted; whisper cannot be heard on either side (vocals only are heard); conversational voice, 50 *cm.* on either side, with frequent mistakes in naming the consonants. Watch (anchor movement) not heard on contact or by B.-C. A loud-ticking pivot watch is heard at 1 *cm.* from both ears; not heard by B.-C. All the notes of the piano are heard uniform and pure. The c fork (66 double-vibrations) is heard by A.-C., left ear, nearly till it dies away (— 10 seconds); the right ear hardly so long (— 60 seconds). The f<sup>sharp</sup> fork is heard for a while on both sides by

A.-C. ; right not so long as left. The same is the case with the fork  $c^0$ . The  $f^s$  sharp fork cannot be heard by B.-C. no matter how hard it is struck, and with all the other forks,  $c^3$ ,  $c^1$ ,  $e$ ,  $c$ , A.-C. preponderates distinctly over B.-C. With the  $c$  fork, A.-C. is better than B.-C. in the left ear, while in the right ear the condition is precisely the opposite, though hardly so well marked. Thus, if I applied the fork to the mastoid process after its tone by A.-C. had died away, the patient could not state precisely whether he really heard the tone again, or whether he heard the echo of the tone which had previously died away, plus the sensation from the sensitive nerves of the skin. The treatment, which could not unfortunately be continued for a sufficient length of time (only three or four weeks), was insignificant in its results. The local treatment consisted in an insufflation of a three-per-cent solution of potassic iodide through the catheter. We administered internally Karlsbad salts, potassic iodide, and resorted also to local depletion by the artificial leech. The naso-pharyngeal catarrh was also suitably treated.

There can be no doubt that this case was one of a mixed affection of the middle ear and labyrinth. If it had been a simple chronic catarrh of the middle ear, if the extreme deafness had depended simply upon obstructed (aërial) conduction of sound, we should, without question, have expected that B.-C. would predominate over A.-C. (as in thousands of similar cases). Moreover, if the labyrinth had been intact, we could not possibly have explained in so young an individual the total loss of B.-C. for watches, and particularly for the loud-ticking pivot watch. So in precisely the same line of thought, it was equally impossible to diagnose a purely nervous affection of the ear, when we had before us so many catarrhal symptoms, such as the occasional "opening" of the ears with distinct, although transitory, improvement in hearing, the appearance of the *Mt*, the simultaneous presence of naso-pharyngeal catarrh, etc.

*All of these thoughts open up to us the question whether in such cases the preponderance of B.-C., which was to have been expected from the affection of the middle ear, has in any way been weakened or equalized by a simultaneous affection of the labyrinth ; or, in other words, whether the predominance of B.-C. always presupposes that the perception is more or less intact. Such a view as this appears to me theoretically and*

*clinically to have many things in its favor*, for in A.-C., as usually observed, the vibration of the labyrinthian fluids (as a whole) undoubtedly develops a greater potential energy for the excitation (tetanization) of the fibres of the auditory nerve<sup>1</sup> than the simple molecular vibrations in the case of B.-C. We know, further—and this seems to me a point of great importance,—that not only does B.-C. diminish proportionately in its relation to A. C. in advanced years (with a simultaneous decrease in the perception of high tones, of which I shall speak anon), from a lack of excitability in the nervous organs, but that in cases of hysterical anæsthesia of the auditory nerve, B.-C. (and high tones also) ceases much sooner than the aerial conduction of sounds.

*In mixed cases, therefore, we are obliged to consider two causes which come into play: The first, which intensifies B.-C. (by resonance), but which is not present to the same amount in all affections of the sound-conducting apparatus; and the second, which diminishes B.-C. in comparison with A.-C., and is dependent upon some affection of the nervous apparatus.* Both causes can, of course, combine in the most varying degrees and amount, and the latter cause, so far as it contributes to our means of diagnosis, is much more difficult to discover than the former.

If we look at the subject in this light, the diminution of B.-C. in advanced years is to be judged from a diagnostic point of view, and not as a mere exception to the rule. Thus, if we happen to discover that B.-C. is diminished rather than increased in a case of middle-ear sclerosis in a patient of fifty or sixty years of age, this would mean that in addition to the affection of the middle ear, the patient was suffering from senile alterations in the labyrinth (organs of perception) which had reduced the preponderance of B.-C., as generally observed in such forms of aural disease. It would be instructive in such cases to determine whether in any anomalies of the resonance of the ear (such as the pressure of cerumen or artificial occlusion of the meatus) B.-C. might not still exceed A.-C. in amount.

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Politzer, who, as it seems to me, unjustly grants less diagnostic

<sup>1</sup> Hensen: "Physiologie des Gehörs," page 106.

value to the relations between B.-C. and A. C. than to Weber's experiment, says of the conduction by bone and air ("Lehrbuch," page 785), that "by themselves alone they offer less accuracy than any other tests of hearing, since in numerous cases in which the objective examination undoubtedly indicated an affection of the middle ear with or without perforation of the *Mt*, Rinne's experiment had left him entirely in the lurch (*i. e.*, preponderance of A.-C.); and, on the contrary, in those cases in which other tests of hearing suggested that the labyrinth might be affected, he had found a preponderance in favor of B.-C." Despite this assertion, the very first question that we ought to put to ourselves would be, whether these exceptional cases were not perhaps of a mixed nature,—a point upon which Politzer does not touch at all, and which with the means at present at our command cannot always be accurately decided. Nevertheless, such exceptional cases as these are of value only when all their details can be accurately examined, and I confidently believe that a majority of all of these apparent exceptions can be easily explained by the axioms which I have just laid down. When, therefore, in a case of well-marked affection of the middle ear, A.-C. preponderates over B.-C., we must carefully search for any cause which may in any manner have altered the result which we had confidently expected to find, and so in the same way in cases of nervous deafness in which B.-C. unexpectedly preponderates over A.-C.

*b. A further source of error, and one which, unfortunately, cannot be wholly eliminated, lies in the manner in which the hearing is tested, and here I refer chiefly to the locality at which the T.-F. is to be applied, and the sort of a fork to be employed.* Concerning the first point, we may remark that it is well known that any given spot upon the skull may differ exceedingly in its B.-C. powers, in comparison with every other point on the same side of the head. Still, and unfortunately for our method I think, it is a fact that the influence of the locality at which the T.-F. is applied, is much less than in Weber's experiment.

I will here venture to insert a self-observation of recent date. One morning I happened to notice that the act of combing my hair on the RIGHT side and near the vertex of the skull produced a very striking tympanitic sound. When I tapped on the same



region and especially on the upper part of it with one of my fingers, I could produce the same tympanitic tone, which strangely resembled the sound of a child's drum. Toward the occiput, the tone suddenly varied and became extremely dull. The phenomenon was not noticed on the LEFT side (with exception of over the left zygomatic arch). On the contrary it was quite audible on striking together the left teeth, but not so on striking the teeth on the right side. Repeated tapping with the finger on each mastoid process in succession failed to produce the tympanitic sound. A prismatic tuning-fork *c* when applied to some spots on the right portion of the vertex produced a loud deep-sounding tone, which seemed—though very indistinctly—to extend toward the left ear. There was, however, no unilateral intensification of sound either from the right or left mastoid process. On the contrary whenever I occluded either the right ear or the left, the tone was invariably heard in the ear which happened to be occluded. After I had syringed away from the *left* meatus a few crumbs of cerumen interspersed with hairs<sup>1</sup> the pathological resonance instantly ceased and did not return. This was, I may here observe, the only symptom noticed. For the time being, however, my own voice appeared somewhat intensified when I spoke louder than usual, but it was not sufficient to be in any way annoying. My hearing was not in any way disturbed during this phenomenon.

There can be no doubt that the crumb of cerumen or the minute hairs resting against the left *Mt*, had as I suspected, produced the peculiar resonance. The striking localization of the resonance (from the right vertex and the left teeth) is interesting. I imagine that this indicates the direction of the impetus, which at one time brought the hair into contact with the *Mt*, but not at others. The vibrations of the various tuning-forks were not powerful enough to cause such a motion, so that they did not produce the phenomenon at all, or so faintly as to be practically speaking, inaudible.

*I agree with Lucæ, Emerson, and others in choosing the mastoid process as the most suitable location for applying the tuning-fork.* For, according to my experience, the results when tested here are the most accurate, and less subjected to uncontrollable variations than, for example, near or on

<sup>1</sup> When I went to bed on the night before, I noticed, as I laid my head on the pillow a faint crackling sound in the *left* ear, and at once suspected that a bit of cerumen had fallen against the *Mt*.



the vertex. Yet it is an excellent plan to test B.-C. at other points on the cranium, in order to verify the tests which have previously been made on the mastoid process. *The T.-F. should always be pressed firmly against the bone, for if applied loosely the tone is heard much less distinctly.*

*My experience teaches me also that there is another source of error to be found in the fact that the relation between A.-C. and B.-C., even in the normal ear, is not always the same for all forks, since low-pitched forks (large C, for instance) are heard better and with more facility by B.-C., than high-pitched forks (e. g., f<sup>sharp</sup>). This circumstance seems to depend less upon the greater mass of the deep forks than upon the number of vibrations, and arises probably from the fact that the slower vibrations of deep forks possess a greater potential energy than in the case of high forks, and consequently are more capable of exciting vibrations in the bones and various organs of the labyrinth. This view seems to be favored by the fact that the sound of the high T.-F. dies away sooner than that of the low, and that the sensation on touching the C T.-F. is much more powerful than on touching the f<sup>sharp</sup> fork, such as is used by Lucæ, although the fork in question is by no means small.<sup>1</sup>*

Thus I feel the vibrations of the C fork distinctly with my fingers when the fork has almost ceased to vibrate and the tone is scarcely audible by A. C. But with the f<sup>sharp</sup> fork it is quite another affair, for the sensation perceived by the fingers is very slight, even when we hit the fork a violent blow, and when it is giving off a shrill and forcible ærial tone, while the mere touch of the fingers to the prongs extinguishes the tone at once, which is by no means the case with deeper forks. It is to me passing strange that so little attention has thus far been paid to this relation between high- and low-pitched forks. Dennert<sup>2</sup> asserts, on the contrary, "that in diseases of the ear, the tones which are perceived by B.-C. *show much more constant relations*, so far as concerns the normal mutual proportions of the intensity of the sensation, than when the same tones are heard simply

<sup>1</sup> The prongs of the fork are 62 mm. long, 23 mm. broad, and 12 mm. thick.

<sup>2</sup> *Archiv f. Ohrenheilk.*, Band xx., page 5.

by A. C." For all that, I gladly see that my observations, which, without any such especial verification, ought to be clear to everybody, have lately been fortified and justified in a recent paper of Emerson's.<sup>1</sup>

Emerson employed two tuning-forks, one, a, of 110 double vibrations, the other  $c^2$  of 528 double vibrations, and discovered in fifty persons with normal hearing that the a fork was invariably heard *louder* by B.-C., the  $c^2$  fork louder by A.-C. Additionally, he found that both forks were heard *longer* by A.-C. than by B.-C., but that the preponderance of A.-C. over B.-C. with the  $c^2$  fork was much greater than with the a fork. He expresses the opinion that for  $c^1$ , the relation of A.-C. to B.-C. in normal ears is about 2 to 1; for  $c^2$ , 2.25 to 1; and for a, 1.72 to 1. If he had used forks of a still higher pitch, the difference would, in my opinion, have been still more considerable.

These experiments show (1) that very high forks, *e. g.*,  $f^4$  sharp, are not very suitable for testing the relations between A.-C. and B.-C.; (2) that we ought to unite upon a uniform shape and dimensions of the forks to be employed, for it is by no means a matter of indifference, whether the one observer is provided with a cylindrical and the other with a prismatic tuning-fork. So far as our present purposes are concerned,  $c^2$ ,  $c^1$ , and middle c (66 double vibrations), provided with clamps, are quite sufficient. For other methods we should of course need a larger assortment. The normal relation between A. C. and B.-C. would then have to be arranged for each fork, as well as for the tones to be produced by the clamps. Finally, we should have to agree upon (3) fixed rules for the method of examination, in which respect again we should meet with many difficulties.

If we measure, *e. g.*, the duration of the perception by B.-C. and A.-C., we encounter at once the difficulty of invariably hitting the fork with the same force for both tests. If, however, we compare the intensity of the sensation by alternately holding the fork against the bone and then in front of the meatus, we can generally avoid the difficulty just

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<sup>1</sup> These ARCHIVES, vol. xii., p. 63.

suggested, only we must bear in mind that the fact of hearing the fork louder, does not always coincide with hearing it longer. We must therefore pay attention to both of these points.

Emerson says that he endeavored to give the same force to the fork by hitting it always against his knee, and by taking care to hold it always at the same distance and in the same position with each person. When testing A.-C., the fork was held at half an inch from the auricle, and turned continually in order to avoid weariness and interference of the "deaf spots"; for testing B.-C. the fork was placed upon the junction of the mastoid and squamous portions (close behind the ear). The duration of A.-C. and B.-C. was measured separately in every case.

It seems to me that we might escape the errors arising from *any inequality in the force with which the fork has been struck*, by measuring the time during which the tone is still perceived upon the mastoid process after it has died away at any given spot, *e. g.*, in front of the orifice of the meatus and *vice versa*.

*We should never strike the high-pitched, shrill tuning-forks too hard, or strike them any harder than is necessary*, because we may transitorily diminish the amount of perception by excessive irritation of the organ of hearing (Jacobson).

If the difference between A.-C. and B.-C. is very slight, we shall obtain greater accuracy by verifying the results by repeated measurements, particularly in the case of poorly educated patients, whose answers under such circumstances are often far from trustworthy.

c. I have already mentioned that B.-C. is not always equally intensified in proportion to A.-C. in all diseases of the sound-conducting apparatus. I have found the preponderance most pronounced in occlusion of the meatus by cerumen, polypi, furuncles, fluids, etc.; further, in inflammatory swelling of the mucous membrane of the tympanum, particularly when any secretion is present in this cavity; also in cases of acute or subacute otitis media, with or without perforation of the *Mt*, as well as in chronic suppurative inflammation of the middle ear. On the contrary, I have found

it less marked, though always present, in simple chronic catarrh of the middle ear, during the stage of the so-called sclerosis; a fact which can be explained by the circumstance that in this disease the opportunities for pathological resonance in the ear are present to a moderate degree only.

d. Finally, we must mention that in simple unilateral affections the result of our tests may be invalidated by the hearing of the healthy ear, although to a less amount than in Weber's experiment.

Before passing to the second part of this paper, I will venture to call attention to the testing of B.-C. by the watch, which of late years, and even as I confess by myself, has been wrongfully neglected. The following observation in the year 1869, appears to prove that Politzer is correct when he says<sup>1</sup>: "*But despite this, we cannot dispense with the test of hearing with the watch, as a weaker source of sound, in cases in which we have to decide not only whether any vibrations can be heard at all by the bones of the head, but at the same time to get some idea of the extent to which the hearing has diminished.*"

A child æt. twelve, otherwise healthy, had suffered since infancy with naso-pharyngeal catarrh, with increasing deafness, which varied, however, in amount from time to time. Otorrhœa, pain in the ear, and tinnitus had never been noticed. The child's father, otherwise healthy, had suffered for years from chronic nasal catarrh and deafness. Examination showed both *Mt* normal in color and tint, but very concave; excessive stenosis of the tubes, granular pharyngitis, and rhinitis. The anchor watch was not heard on either side; the pivot watch on both sides in contact. *Neither of these watches could be heard by bone-conduction from any part of the skull, but the common small a<sup>1</sup> and c<sup>2</sup> tuning-forks, such as are found on sale in music shops, could be heard by B.-C. even when struck gently.*

The treatment, which was chiefly directed against the catarrh and persisted in for several weeks, was as little successful as that which had previously been undertaken by a brother aurist. Since then, the patient, as I have learned, has become *totally* deaf, and is obliged to rely entirely upon lip-reading in order to understand ordinary conversation.

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<sup>1</sup> "Lehrbuch," p. 202.

This observation shows that tuning-forks, even when gently struck, transmit their vibrations along the bones of the skull with greater facility than watches (even the old-fashioned anchor watches with a very loud tick), and that until we discover something more suitable we should always employ watches in order to verify the results obtained by the T.-F. It appears to me, moreover, that for the purpose of securing the same *loudness* and *pitch* of the tick, we ought to agree upon at least two modes, the constancy of which would offer no difficulties when we recall to mind the perfection of the machinery now employed in the manufacture of watches.

I will not at this point discuss with any great degree of nicety the diagnostic value of Weber's experiment, which is based upon the fact that in cases of peripheral affections of the ear, the T.-F., when placed on the median line of the skull, is heard solely, or heard louder upon the diseased than upon the healthy side. Although Politzer asserts<sup>1</sup> that this method offers greater certainty in diagnosis than those which I have just described. I am sorry that I cannot agree with him, for on the one hand Weber's experiment is better fitted for unilateral affections, while, as is well known, a large majority of our patients suffer from bilateral disease; and on the other hand, the sources of error attached to this experiment are much more vital, since the place at which the T.-F. is applied—especially when both ears are more or less affected—exercises a decisive influence upon the results obtained, although, so far as we know, its precise amount has not yet been accurately defined.

## II.

Bonafont<sup>2</sup> and Moos<sup>3</sup> were the first observers to call attention to the fact that in many cases of nervous (labyrinthine) deafness the perception for high tones decreases much sooner than that for low tones. Since then the question of testing the hearing for the quantitative perception of high

<sup>1</sup> "Lehrbuch," p. 785.

<sup>2</sup> *Compte Rendu de l'académie des sciences*, May, 1845.

<sup>3</sup> These *ARCHIVES*, vol. iii., part I., page 113.

and low tones has been more carefully studied by Lucæ,<sup>1</sup> and by his pupils, Dennert and Jacobson.<sup>2</sup>

*Lucæ believes that a remarkably good perception of the low tones in proportion to the remnant of hearing present, together with simultaneous diminution in the perception of high tones, points with great probability to a disease of the labyrinth (or, more generally expressed, of the nervous parts of the organ of hearing).*

Now it is a fact that the normal ear is more sensitive to high tones than to low, and clinical observation teaches us that in a great majority of diseases of the external and middle ear, high tones are perceived more readily than those which are low.

When, therefore, in a case of undoubted labyrinthine or so-called nervous deafness, we meet with precisely the opposite condition<sup>3</sup> (low tones heard better than high tones) it is a fact which is worthy of our very careful consideration. We will, however, at once remark that such a condition is by no means exceptional, for cases have been reported in which the perception for all tones was uniformly diminished, or in which, inversely, the low tones were not heard at all, or at the best but slightly. Yet as we meet with general as well as localized morbid processes in the labyrinth, we ought not to be surprised if these should at one time affect the low tones only, and at another the high tones alone.

Long-continued and persevering observation must teach us to which forms of labyrinthine (nervous) deafness this condition of which we are speaking is peculiar, and whether it deserves any general significance, *perhaps in the sense that in the perception of high tones much greater demands are made upon the sensibility of that portion of the labyrinthine apparatus involved, and consequently that the function of this portion is much more easily and much more rapidly interrupted by increased waste and pathological processes than happens elsewhere.*

<sup>1</sup> *Archiv f. Ohrenhlkde*, Band xiv., page 134; Band xv., page 273; Band xix., page 73.

<sup>2</sup> Dennert: *Berlin. klin. Wochens.*, 1881, No. 18, and *Archiv. f. Ohrenhlkde*, Band xx., page 1. Jacobson: *Archiv f. Ohrenhlkde*, Band xix., page 44.

<sup>3</sup> Lucæ has described two such cases (*Archiv f. Ohrenhlkde*, Band xv., page 273), which he observed during life and examined after death.

Such a view as this appears to me to gain considerable degree of probability from the following considerations and observations:

a. *Many interesting observations have already been made in cases of hysterical anæsthesia of the auditory nerve.*<sup>1</sup> I have already remarked that in such cases as these, B.-C., invariably ceases sooner than A.-C., and in the same manner, according to Walton, the high tones appear to be lost sooner than the middle or deep tones (in a case of Westphal's, from  $c^8$  upward), yet bone-conduction ceases even in the milder forms of hysterical anæsthesia sooner than the perception of high tones.

b. *In advanced age also we meet not only with a decrease in B.-C., in contrast with A.-C., but with diminished perception of the highest tones, so that, e. g., the chirping of a cricket can no longer be heard* (I would suggest that the diminution in the perception of the highest tones has been less carefully examined than the proportional diminution of B.-C. in comparison with A.-C.). Both conditions have been correctly referred to senile torpor of the auditory nerve and its terminal apparatus.

c. In the same way the perception of high tones appears to decrease first of all in those occupations which are carried on amidst noisy surroundings.

d. Finally, I would call attention to the following fact: *There can be no reasonable doubt that the potential energy which is necessary for the excitation of the nervous terminal apparatus of the nerve of hearing is much more powerful at the entrance, in the lowest convolution of the cochlea than in the superior or uppermost convolutions.* We should then have to recall to mind<sup>2</sup> that the wave which enters at the base of the cochlea does not simply extend as far as the helicotrema,<sup>3</sup> but passes along the entire tract through the elastic membrana basilaris toward the scala tympani, and in so doing excites the acoustic terminal organs. During all

<sup>1</sup> Ueber die Taubheit bei hysterischer Hemianæsthesie. Von Walton: "Verhandl. der Berlin. physiolog. Gesellschaft," 1883, Band ix., page 2. Reference in *Monatschr. f. Ohrenhkd.*, 1883, page 70.

<sup>2</sup> Hensen: "Physiologie des Gehörs," p. 106.

<sup>3</sup> According to Hensen, the helicotrema serves as a sort of compensator in slow alterations of pressure.



this time, however, it is losing its energy as it overcomes, one by one, the various obstructions in its path. *If now the portions attuned for the high tones are placed, contrary to the space at command in the lowest convolutions of the cochlea, we have a right to suppose that this arrangement was so effected because it is more difficult for high tones to excite the nervous terminal apparatus concerned than it is for those in the middle or lower octaves.*

If we look at the subject from this point of view, we could easily explain the greater sensitiveness of our ears for high tones, as well as the fact that these tones are earlier lost to hearing. We could thus also easily comprehend how it is that in B.-C. the deeper tones predominate over the high, for in this process the advantages offered to the organs for the perception of high tones by the internal arrangement of the cochlea do not come into play. I leave aside all consideration of the question whether there is any connection between this supposed situation of the organs attuned for high tones and the perception of a very high-pitched subjective ringing sound whenever our ears are exposed to a violent explosive noise, as well as how far the high-pitched proper tone of the drumhead and meatus must be considered during this phenomenon.

Let us now turn to the diagnostic value of the symptom which we have so long been discussing. Lucæ<sup>1</sup> describes the importance of Rinne's experiment, and remarks that if it results negatively, we have a right to diagnosticate a disease of the sound-conducting apparatus, but at the same time we cannot absolutely exclude a simultaneous affection of the nervous portion. He then continues: "In order to examine this last point, we finally test the aerial conduction of sounds which lie in the very high (four times scored) octaves, for these tones, as experience teaches us, can still be perceived passably well, even with very decided obstructions in the sound-conducting apparatus, while in disturbances of the percipient nervous apparatus they are heard very slightly or not at all."

I should hardly dare to give utterance to views so posi-

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<sup>1</sup> *Archiv f. Ohrenhikde*, Band xix., p. 74.



tive as these, and Lucæ expressed himself with much more reserve in his previous papers.

1. It must be confessed, to start with, that there are diseases of the nervous apparatus in which the perception for high and low tones is uniformly diminished. These cases are rare, yet they do occur,<sup>1</sup> as I can confirm from my own observation. And Dennert also<sup>2</sup> says that the uniform diminution of the perceptivity for high and low tones is the one most frequently met with, and that it is observed in diseases of the *external as well as of the internal ear*. Therefore we have no right, in the absence of this symptom, to conclude that the perception of sound is unimpaired.

2. And what is worse, the opposite condition (diminished perception for low tones in comparison with high tones) appears now and then to occur, and not in cases of pure bass-deafness solely. We can, however, easily disregard this symptom, for, on the one hand, it will not place any difficulties in the way to a correct diagnosis, since the loss of a limited series of tones alone indicates, and in no uncertain manner, that the labyrinth has become affected,<sup>3</sup> while, on the other hand, it is plain enough that there can be general as well as localized affections in the labyrinth (cochlea) also, and that the earlier loss of the perception of high tones can only be relied upon in the diagnosis of diseases of the first group. But there seem, unfortunately, to be observations from which we cannot so easily escape: labyrinthine or nervous affections of a more general nature, in which in a similar manner the low tones are less distinctly heard. With this particular group of cases, I regret to say that I have had no personal experience, but I have lately discovered by accident a case reported by Moos<sup>4</sup> which appears to belong to this class.

Moos describes the case as follows: Affection of the organ of

<sup>1</sup> Amongst cases of this sort is to be reckoned one reported from Lucæ's polyclinique, *Archiv f. Ohrenhklde*, Band xv., p. 134, "Ueber Nerventaubheit nach Epilepsie."

<sup>2</sup> "Zur Analyse des Gehörorgans," *Berl. klin. Wochenschr.*

<sup>3</sup> The only circumstance that might lead to an incorrect diagnosis would be the coincidence of bass-deafness with a general decrease of the hearing from chronic catarrh of the middle ear.

<sup>4</sup> These ARCHIVES, vol. iii., part 1, p. 120.

hearing, presenting the symptoms of so-called Ménière's disease; deafness of the right ear; permanent deafness as regards the lower tones; return of the perceptivity for the high tones; partial return of the perception of speech. The lower notes of the piano up to middle *f* were not heard at all; from middle *f* upward they became progressively more and more distinct. During the first few days no tuning-forks could be heard (*A*, *C*<sup>1</sup>, *C*<sup>2</sup>) either by *A.-C.* or *B.-C.*, while the hearing for the watch, as well as for the voice, was very much reduced. The patient suffered from repeated attacks of vertigo, vomiting, and extremely loud tinnitus.

This could not possibly have been a pure deafness for bass notes—*i. e.*, a morbid process localized in the uppermost convolutions of the cochlea, because the original deafness of the ear affected was general and not localized, and when we come to consider the whole case we can see no reason why, in total diseases also of the labyrinth or cochlea (exudations, hemorrhages, etc.), the subsequent process of contraction might not at one time more seriously affect the lower and, at another time, the median or upper portions of the lamina spiralis. *We shall consequently see in the preponderance of the lower tones over the high, a symptom which is well worth considering; yet, neither the total absence of this diagnostic point, nor precisely the opposite condition, would justify us in asserting that the cause of the deafness could not possibly be ascribed to a labyrinthine disease.*

If I am correct in my conjecture, that the vibrations of the high tones have greater difficulty than the slow (deep) vibrations<sup>1</sup> in mechanically exciting the fibres of the auditory nerve, I could easily imagine to myself in what sort of cases we might expect to find the low tones favored in contrast with the high tones: 1. In cases of general diminished excitability of the fibres of the auditory nerve, as, *e. g.*, in hysterical paresis of the auditory nerve, in senile torpor of the nervous portions of the organ of hearing, in a blunted condition of the labyrinth due to noisy occupations. 2. In conditions which, on the whole, uniformly diminish the

<sup>1</sup> I have already pointed out while discussing the question of *B.-C.*, that the vibrations of low tuning-forks cause a disproportionately forcible sensation to the finger with which they come into contact, and that when tested by *B.-C.* they are perceived more loudly and much sooner than the high forks, despite the more intense aerial tone which the latter give off.

vibratory energy of the tuned apparatus of the labyrinth, *e. g.*, rigidity of the organs of Corti, and perhaps also in conditions of increased labyrinthine pressure. In the latter point of view we should be obliged to recall to mind the experiments of C. H. Burnett,<sup>1</sup> according to which the excursions of the round window and of the ossicles diminished and even ceased when the labyrinthine pressure was increased beyond a certain limit, *and sooner in the case of high tones than with low.*

We now have to examine the question whether also in diseases of the sound-conducting apparatus, low tones have ever been known to be heard better than high tones. Politzer affirms that this is so,<sup>2</sup> without, however, going very deeply into the subject, and yet it would be of the most exciting interest to study these exceptional cases more closely, for it is unquestioned *that in a great majority* of middle-ear diseases, the high tones are undoubtedly heard far better. We know that increased tension of the *Mt* favors the transmission of high tones rather than low, and Politzer himself<sup>3</sup> demonstrated years ago that if we artificially weight the ossicles (*e. g.*, with a small bit of wax), *their excursions are less extensive to low notes than to high*, and he remarks additionally that the reinforcement thus granted to the high tones coincides with clinical observation in cases of adhesions and ankylosis in the middle ear. While this assertion finds an application in numerous recorded cases of sclerosis of the middle ear, Wolfe<sup>4</sup> has likewise come to the conclusion, so far as concerns his careful investigations into perforations and defects in the *Mt*, that the higher the fundamental tone of a consonant lies in the scale, so much the easier will it be perceived.

The question of the influence of pathological conditions

<sup>1</sup> These ARCHIVES, vol. ii., part 2, p. 51.

<sup>2</sup> He says, page 784 of his "Lehrbuch": "Although this method of examination has obtained a certain diagnostic value, yet a diagnosis of an affection of the auditory nerve *ought not to be based upon this test alone*, because low tones are sometimes perceived better than high tones, even in diseases of the middle ear, while inversely the perception of low tones has been known to decrease more rapidly than the perception of high tones in well-established affections of the labyrinth.

<sup>3</sup> *Archiv f. Ohrenhklde*, Band vi., p. 35. "Lehrbuch," p. 74.

<sup>4</sup> "Sprache und Ohr," p. 177.

on or about the *intrinsic muscles of the ear*, upon the perception of high and low tones, has not yet been sufficiently investigated, and yet I cannot believe that our diagnostic conclusions have suffered much in this respect. As for the tensor tympani, we should have to consider increased tension chiefly, or such similar causes as are supposed to increase the perception of high tones over low. Concerning the stapedius we are still less informed. In facial paralysis the symptoms on the part of the hearing do not appear especially important, and all the clinical observations that I have been able to collect, contradict one another exceedingly, some observers discovering a partial diminution of the acuteness of hearing, others an increased sensibility, an abnormal acuteness of hearing for all musical tones, especially for low tones.<sup>1</sup> Finally, I would remark that Mach and Kessel experimentally discovered, on exercising tension upon the stapedius (as well as the tensor tympani), that the excursions of the ossicles were slightly diminished, but that there did not appear to be any preponderance in favor of the perception of high tones over low tones or *vice versa*.

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<sup>1</sup> In a case of facial paralysis, observed by Moos, the acuteness of hearing for low tones on the affected side was double that upon the healthy side.

## CALOMEL IN THE TREATMENT OF OTORRHOEA.

By J. GOTTSTEIN, Breslau.

Translated by Dr. J. B. McMAHON, New York.

WHEN Bezold, in 1880 (*Archiv f. Ohrenheilk.*, Bd. xv., Heft 1), introduced boric acid in the treatment of purulent otitis, he acted on the correct idea that in order to carry out a thoroughly antiseptic treatment of the ear, this organ must not only be rendered temporarily aseptic by injections made once or several times daily, but that the entrance of the injurious agents contained in the air must be permanently prevented. He insisted also upon these two requirements in antiseptics intended for use in the ear: First, the remedies should be free from any irritant effect on the mucous membrane of the middle ear; and secondly, they should form, neither in nor upon the mucous membrane, deposits difficult of removal.

That the impalpable boracic acid satisfied those requirements better than other means, and that its introduction should be regarded as a positive advance in the treatment of otorrhœas, is proved by the universal recognition of its worth and the rapidity with which it has been adopted by all aurists.

While the advantages of this remedy are great, and I have learned to value them fully, it cannot be denied that the remedy fails in a considerable number of cases, and the result is often relatively tedious. This occurs not only in complicated cases (with destructive bone processes, ad-

vanced pulmonary phthisis, inflammation of the upper part of the tympanic cavity, and perforation of Schrapnell's membrane), which Bezold has already excluded in his estimate of the value of the boric-acid treatment, but it happens also in simple suppurations, in which the result depends either exclusively or in great part on the maintenance of antiseptis. It is admitted that boric acid is one of the weaker antiseptic agents. It is on this account that various authors have sought for more efficient antiseptic methods of treatment suitable for the ear. As substitutes, iodoform and corrosive sublimate (Wagenhäuser) were proposed, and, still more recently, by Bürkner, red precipitate in conjunction with sublimate.

The iodoform has proved satisfactory in no way. I myself have no experience with the red precipitate, but the communications of Bürkner establish beyond doubt the very limited range of its utility. The sublimate, which has a most extended application in surgery on account of its powerful antiseptic properties, satisfies only one requirement in the treatment of otorrhœa—namely, to render the ear temporarily aseptic. It does not fill the other equally imperative indication, to exclude permanently the disease germs as far as possible. This must be sought in another way and by other means.

I have for some time employed solutions of corrosive sublimate (of varying strength) as injections or instillations, but have always supplemented their use with insufflations of finely powdered boric acid. For cleansing the ear, I prefer injections of the sublimate to other means, but I cannot assert that its use in conjunction with the boric acid has materially contributed to hasten the cure of otorrhœas. On the other hand, I believe that I can recommend the combined use of calomel and sublimate as a method not only of equal value to the boric-acid treatment, but one which in many cases produces a more prompt and decided effect.

I assume that corrosive sublimate is formed when calomel is acted on by fluids containing sodium chloride, and, therefore, by pus. That sublimate has markedly anti-

septic properties is beyond doubt; it is probable, moreover, that these are more intense in the nascent state.

So far, then, as antiseptics is concerned in the treatment of otorrhœa, the most favorable conditions seem to obtain. But there remains the question if the other conditions, which, following Bezold, we have described as measuring the efficacy of the therapeutic agent, are also fulfilled; and finally how the results of experience correspond with our suppositions.

So far as I can learn from the literature at my disposal, Wendt was the first to recommend calomel as a local application in purulent otitis. To what extent he has used it, I do not know. He states only (*Archiv f. Ohrenheilk.*, Bd. iii., page 28) that he has frequently made insufflations of alum or calomel through a quill in cases with large perforations, when the secretion had diminished and the swelling of the mucous membrane somewhat subsided, and that he prefers the calomel on account of its insolubility, and because its action is therefore that of a purely mechanical irritant. I cannot determine if other authors, following Wendt, have tried the calomel. In the most recent text-book on diseases of the ear, that of Urbantschitsch, I find the general remark: "Calomel is also recommended for insufflation into the ear." The same author refers also to the occasional favorable action of the mercurial preparations in general in purulent inflammations of the middle ear. Neither Wendt nor Urbantschitsch have employed it as an antiseptic agent; the latter includes it among the astringents.

During the past year, I have used the calomel by way of trial in a number of cases that have seemed suitable, especially such as could be submitted to daily observation.

I have satisfied myself (1) that the remedy is absolutely free from irritation to the mucous membrane of the middle ear; (2) that it forms neither upon nor in the mucous membrane any precipitate difficult of removal; (3) that surprising results are often attained under its use.

Accordingly, since the beginning of the present year, I have, in my private practice as well as in my polyclinic, employed calomel in the treatment of all cases of otorrhœa

in which, following Bezold's direction, I had previously made use of boric acid alone, or as a supplementary means. I withheld the calomel only from such patients as, coming from a distance, I had an opportunity to see but once.

My observations now exceed eighty in number, so that I feel justified in communicating the results of my experience with this method.

My method of procedure is as follows: The ear is, in the usual way, syringed carefully with a weak sublimate solution (one tenth per cent.); the residue of the secretion is forced into the external meatus by the employment of Politzer's method, and then removed by syringing; and, finally, the ear is well dried with cotton.

The calomel (*vapore parat.*) is then blown in through a powder-blower,<sup>1</sup> and the auditory canal closed as well as possible by means of cotton. The further treatment is the same as with the boric acid.

Before I go further, I would answer the possible objection, that the effects which I attribute to the calomel are really the result of the sublimate injections.

To this I may say that, on the one hand, the use of the sublimate, even when employed in conjunction with boric acid, has not shown equally striking results; and, on the other, the value of the calomel treatment remained the same when injections of other solutions than the sublimate were resorted to.

I shall, later, return to the question of the correctness of the assumption that a partial conversion of the calomel into corrosive sublimate occurs.

When I review the results of the calomel treatment, I can state, by way of preface, that it possesses all the advantages justly attributed to the boric acid, while, in some respects, it is superior to it. It is so absolutely devoid of irritation to the mucous membrane of the middle ear that I

<sup>1</sup>In my consultation hours, I make use of the powder-blower of Kabierski (*Centralblatt für Chirurgie*, 1883, No. 33), which I have found, after long trial, the most suitable for the treatment of the ear as well as of the nose and larynx. It has the advantage that it does not need to be filled for each case, that the insufflation can be made with ease and accuracy during the examination of the parts, and, finally, a separate tip can be used for each patient, a measure necessary for the attainment of a thorough antiseptis.



have employed it with advantage even at the beginning of acute inflammations.

The powdered calomel is applied easily and removed without difficulty. Whilst boric acid has a tendency to mass itself into lumps, and so close the tube of the insufflator, and also to form with the pus masses in the external meatus, the calomel, from its absolute insolubility, always remains in a finely divided condition, never blocks the insufflator, and does not enter into mechanical combination with the pus in the meatus.

However, these are minor advantages, which would not determine the exclusion of the boric acid.

That on which I lay the most stress is that calomel, in my opinion, has a much more certain and decided antiseptic action than the boric acid.

I am anxious to avoid the error into which those authors fall who overestimate the value of the remedies recommended by them. Calomel also fails in some of the cases in which powerful antiseptic action is desired, because considerable tissue alterations in the drum-cavity are absent. Yet I have, with no method of treatment, not even with the boric acid, attained such speedy results as with this remedy in acute as well as in chronic forms of otorrhœa.

There is a surprising diminution of the discharge in the first few days almost without exception; in acute cases, however, which come early under treatment, the discharge of pus remains the same for from two to four days, and then undergoes a rapid decrease. I have never observed any unpleasant effect, local or systemic. I would mention here that I have been informed by my cousin and friend, Dr. A. Gottstein, Berlin, who, at my request, has made use of the calomel treatment at Hartmann's Polyclinic, that under its use a slight stomatitis was noticed in a weakly exhausted child. I myself have never noticed any changes in the gums, though I have in many patients employed the calomel for weeks.

As for the therapeutic results of the calomel treatment, I can base my judgment only on eighty cases which were not complicated with formation of polypi, necrosis, etc.,

and which, further, I could keep under observation during the whole course of the disease. Every aurist knows how unsatisfactory the treatment of otorrhœa is when carried out by the patients, especially if they are of the poorer classes, and that there is no possibility of an efficient antiseptis under such circumstances. I accordingly hold fast to the principle to have otorrhœa patients come daily, if possible, to the Policlinic for treatment.

From this point of view there are to be considered fifty-seven cases, twenty-seven of acute and thirty of chronic otorrhœa. I do not consider it advisable to give the average duration of the treatment, because the observations are not sufficiently numerous to eliminate the variations arising from marked peculiarities in individual cases. I prefer to draw special attention to the most favorable and most unfavorable cases.

Of the acute cases, twelve were discharged cured in the first ten days, ten between the tenth and twentieth days, and three after this period. Two cases became chronic and are still under treatment. One of these two patients was tuberculous. He had previously been treated with boric acid with the same lack of success. He was not aware of the affection of his lungs; it was only when I sought to discover the cause of the delay in the cure, for which the local conditions offered no satisfactory explanation, that the microscopic examination of the sputa showed the presence of of tubercle-bacilli, and physical examination of his lungs detected the signs of disease. Among the patients cured also was a tuberculous individual. The discharge in this case had ceased by the ninth day, the perforation had closed, but there remained considerable hardness of hearing.

Of the thirty chronic cases, thirteen were cured within the first ten days, seven between the tenth and twentieth days, between this and three months, seven; two remain uncured. The final result is not known in one case which was beginning to improve. One of the unsuccessful cases had previously been treated with boric acid, and also with caustics after the method of Schwartze.

The most important result of these observations, in my

opinion, is not the fact that the majority of the cases have ended in cure (which is due in part to the exclusion of the complicated cases), but that the cure has been effected in a very short time in a proportionately large number of the cases.

Among the acute cases were some very severe inflammations of the middle ear. The following may serve as an example :

A boy of eight years was attacked with otitis, right, at the beginning of an outbreak of measles ; left, two days later ; both resulting in perforation and otorrhœa. In spite of careful treatment by the family physician, Dr. Goldschmidt, who used syringing and boric acid, the suppuration continued. After three weeks a mastoid periostitis, right side, developed with marked fever and severe pains in the head. Thereupon my colleague, Dr. Goldschmidt, referred the patient to me for treatment. By the second day the suppuration on the left side had permanently stopped, on the right there was diminution of the discharge and a cessation of the signs of inflammation of the mastoid process. On the fifth day of the treatment there was a new development of fever, headache, and tenderness in the mastoid region. The auditory canal was found dry, and no perforation was to be seen. Treatment consisted in paracentesis of the drum membrane, evacuation of pus with the air-douche, syringing with sublimate, and insufflation of calomel. Improvement followed. On the sixteenth day of the treatment complete recovery, perforation closed, and hearing good.

Among the chronic cases cured were some which had lasted for years and had been repeatedly treated by different methods without success. In a number of cases of otorrhœa in which the sublimate and calomel treatment proved, after some time, ineffectual, I changed to the boric acid or to the caustic method without, as a rule, obtaining better results. In one case, however, in which the only result of the use of the calomel for several weeks had been a diminution of the secretion, the suppuration ceased after the second insufflation of the boric acid.

I freely concede that my observations so far are not sufficient to determine, with any but an approximate accuracy, the relative merits of the treatment I recommend, as com-

pared with other methods. I have in order to obtain a basis for comparison, treated patients suffering with an otorrhœa of both sides, with the sublimate and calomel for one ear, and boric acid for the other. For this purpose I have generally selected acute cases as presenting less difference in the local conditions of the two ears; yet, although these comparative tests give results favorable to the calomel, I cannot consider them as conclusive, for under similar treatment of both ears, we often observe considerable difference in the duration of the disease on either side; a large number of observations will be necessary to decide the question.

The calomel is also suitable, as is the boric acid, for employment after operations in the middle ear, cauterization with nitrate of silver, the use of the galvano-cautery, and in conjunction with the alcohol treatment. In these cases, the powerful antiseptic action of the remedy is conspicuous.

At first I hesitated to recommend the calomel to patients for home use, but my fears have been without foundation, as the remedy is absolutely free from danger, and I can now record some cures even under the home treatment.

As I set out with the belief that the action of the calomel was due to the formation of sublimate by its partial combination with the chlorides contained in the pus, I have added some table-salt to the solution of sublimate used for injection, in order to ensure and further the supposed chemical process. I cannot say that I have noticed any essential advantage, any shortening of the process of cure, result therefrom.

With the same intention, I have had the calomel triturated with salt, and so used it. This led to the interesting observation that the salt and calomel powder has a weak caustic action. I endeavored to utilize this action therapeutically in otorrhœas with large perforations and considerable swelling of the mucous membrane of the middle ear, by insufflating the salt and calomel and allowing it to remain in the ear twenty-four hours. The powder caused some pain, lasting several minutes, and a temporary increase

of the secretion. On the following day, after removal of the powder and the pus, the mucous membrane of the promontory was found covered with a thin, grayish-white layer, similar to that produced by nitrate of silver. I do not repeat the insufflation of the powder till this layer has separated, but meanwhile employ the pure calomel. In this way I have repeatedly caused diminution of the swelling of the mucous membrane and cessation of the otorrhœa.

I have also found at times after the use of the simple calomel, a whitish, frost-like deposit on the mucous membrane; Bürkner (*Berl. klin. Wochenschr.*, Bd. lxxxiv., No. 1) reports likewise that he has observed a whitish coloration of the mucous membrane after the use of the sublimate injections merely.

Although, after the results I have obtained from the calomel treatment, the question of the correctness of my view, that the calomel undergoes a conversion into the sublimate in the middle ear, has no bearing upon the value of the method, I have sought to obtain positive proof in the matter. I placed in alcohol a number of tampons saturated with pus, which had been removed from the auditory canals of patients under the calomel treatment, without the sublimate injections. In alcohol the calomel is insoluble, the sublimate soluble. Julius Muller, druggist, was friendly enough to make the chemical examination, in the following manner: The alcohol, with the suspended tampons, calomel, and pus were placed in a water-bath and complete evaporation allowed to take place. The residue was repeatedly treated with alcohol at a temperature of 30°-40° Cent., and the filtrate again evaporated as before. The trifling residue was treated with water and hydrochloric acid, the solution filtered, and the filtrate examined by the well-known delicate tests for mercury.

The result was negative—no trace of mercury could be found.

Nevertheless, I hold to my belief that the conversion of the calomel into the mercuric chloride in the middle ear does take place. In favor of this view, we have the analogous behavior of calomel when applied to the conjunctival sac; sec-

ondly, the efficiency of this remedy in otorrhœa, which admits of no other explanation on account of the insolubility of the calomel; furthermore, the resemblance of the local changes which sometimes occur in the mucous membrane to those produced by the sublimate; and finally, the observation made by Dr. A. Gottstein, of a stomatitis after the application of the calomel to the ear.

The negative result of the chemical examination is probably due to the fact that the sublimate in a nascent state enters into a combination with the albumen of the secretion, forming an insoluble albuminate.

I should like to have determined if mercury could be found in the urine during the calomel treatment. The policlinic is poorly adapted, however, for such investigations. I propose to discuss these questions in future communications. For the present I shall but add that in many patients a grayish dark deposit is found in the discharge after the insufflation of calomel. This is doubtless the oxide of mercury, a proof, at all events, that the calomel undergoes a chemical change.

I am now engaged in determining if the irritant action of the salt and calomel can be avoided by the use of a smaller quantity of the salt, and if we can prevent the formation of the albuminate of the mercuric chloride, which in my opinion takes place. Finally, my communication may perhaps induce surgeons to try calomel as a dressing in conjunction with sublimate in smaller ulcers, a practice long since in vogue for condylomata and specific ulcers.

A CASE OF TEMPORARY SUDDEN RESTORA-  
TION OF HEARING AFTER DEAFNESS OF  
TWENTY-ONE YEARS.

By BASIL NORRIS, M.D.

SURGEON U. S. A.

Mrs. Johanna Williams, of Washington, D. C., had been profoundly deaf for twenty-one years. In August, 1881, responding to a message, I was met by her with the cheerful assurance that she could hear as well as she ever did in her life. This lady, who was an acquaintance of some years' standing, surprised me by conversing easily, sitting apart and speaking as we did in a moderate tone of voice. On a previous evening at home, in company with her daughter and a visitor, she enjoyed the conversation and discovered that she was no longer deaf. The following morning she was awakened by a grandchild four years old, whose voice was plainly audible; sparrows on the tin roofing of a back building attracted her attention, and caused her to get out of bed and walk to the window. She heard the milkman arrive, the street cars in motion, footsteps on the pavement, a creaking door, voices outside, and conversation at the table. At market she was confused by a multiplicity of sounds, and becoming faint, sought the assistance of a gentleman to conduct her from the building. Perfect hearing lasted three weeks; she had heard pretty well on two former occasions for two or three days, and was therefore prepared for the relapse which she predicted. The cause of deafness was purely nervous. "I saw from the window," says Mrs. Williams, "the red flag of the auctioneer before the door, and from that moment, and as quickly as that [slapping her hands together], I lost my hearing. It was summer, and there was a terrific storm in the evening; I did not hear it thunder."

Under the heading of nervous deafness, Lawrence Turnbull, in his clinical manual of diseases of the ear, p. 338, quotes a case from Hinton, as follows: "B. H.," at the age of twenty-two, being then in perfect health, and in the possession of all his faculties, was about to call on the parents of the lady who afterward became his wife, but on the morning of the proposed visit he woke up almost entirely deaf. They could not make him hear any thing. Hinton remarks that unquestionably we all of us in our time have felt, or may hope to feel, happily nervous under circumstances like the patient's, but growing stone-deaf under them, he adds, unless it be to an unfavorable reply, is a phenomenon which pathology refuses to accept. It was discovered that this patient suffered an injury to the vertex from a fall of twenty feet down stairs four years previously. Under the same classification of nervous deafness is the case of "I. M.," aged sixty, totally deaf for twenty-five years. The cause assigned by the patient was sudden loss of property, but upon close inquiry he stated that he had a brother as deaf as himself.

I have seen Mrs. Williams to-day, May 12, 1884, at her residence, corner of 9th and 11th streets. She is fifty years of age, active, strong, and cheerful. She says of her numerous family, not one of them was deaf, nor had she suffered from any injury of the head.



## A CASE OF OBJECTIVE NOISES IN BOTH EARS.

BY A. R. BAKER, M.D., CLEVELAND, O.

Nora D., girl, æt. thirteen, referred to me for treatment by Dr. Nichols, of Bradford, Pa., April 16, 1884, suffering from persistent objective and subjective noises in both ears. Good family history, and, with the exception of more or less sore-throat and subject to taking cold, previous history good. Present condition somewhat anæmic; rather small for age; not well nourished. Heart normal; appetite good; bowels regular, and she would sleep well if it were not for noises. All the other functions performed normally, so far as I can discover. Tonsils very much hypertrophied; post-nasal cavity covered with a tough, sticky secretion; nostrils free from obstructions; Eustachian tubes open; ear-drums normal and not retracted; no twitching of palatine or other muscles; swallows without difficulty; hearing slightly impaired (?).

A snapping noise can be heard distinctly at a distance of four feet from right ear, and at eighteen inches from left. The noise continues in each ear independent of that in the other; and is of a much higher pitch and more frequent in the right. The noise sounds very much like that which can be made by snapping the finger-nails. I counted never less than twenty or more than thirty-two per minute in right ear, and about five less in the left, and almost as regular as a clock ticking. Her father says he has counted quite frequently, both when she was asleep and awake, with about the same results. The noises were not influenced by respiration, talking, mastication, swallowing, walking, position, or any thing I could think of which might exert an influence upon it. Dr. Nichols and her father unite in saying the noises are much louder at times, and can be heard across the room. Patient says the noise sounds to her as loud as the firing of musketry in the

same room. She says the noise frequently stops for a few minutes, only to commence louder than before. She don't know which she dreads the most—to have the noise stop or to have it commence again. She lives in constant fear of one or the other. She says there has not been an hour at one time during the past year in which she has not heard the noise. It has been much louder during the past two or three years than formerly, but can not remember the time when she and her friends could not hear noise in her ears. The noise often keeps her awake for hours at night. It annoyed her so much that she was compelled to leave school. Her father is afraid she will become insane if she does not get relief.

I removed the hypertrophied tonsils and ordered the post-nasal cavity to be brushed with a ten- or twenty-grain solution of nitrate of silver, and the use of Politzer's air douche twice weekly; and gave cod-liver oil, bitter tonics, and iron internally.

I was unable to keep the case under my observation, but saw her again Aug. 19, '84. Patient has improved in general condition so that I scarcely recognized her as the same girl I saw four months previously. Hearing normal, post-nasal cavity free from secretions and mucous membrane healthy in appearance, p<sup>h</sup>arynx in good condition. The objective and subjective noises gradually improved for several weeks, and at the end of two months had entirely disappeared. The patient can, however, by a voluntary effort cause noises to return in right ear, and occasionally can do so in left, but can offer no explanation of how she does it. When she has started the snapping noises they continue independent of any voluntary effort, until she makes such an effort to stop them. They continue uninterrupted during suspension of breathing, during conversation while her attention is purposely called to various subjects, and retain the same essential characteristics as to loudness, pitch, frequency, etc., as when they were involuntary.

An explanation of the cause of the peculiar snapping noise in the above case puzzled me considerably. I was inclined at first to exclude any spasmodic muscular action because the patient was sensible of none, and there was none to be recognized by myself, and attribute the noise entirely to the influence of the air during respiration upon the sticky mucus in the Eustachian canal. The results of treatment would rather sustain this view of its pathology. But there

were a number of features in the case which could not be accounted for by this hypothesis, and I was forced to the conclusion there must be spasmodic muscular action near the Eustachian tube, probably the upper fibres of the superior constrictor of the pharynx, as suggested by Burnett.

The enlarged tonsils were undoubtedly the exciting cause of the spasmodic trouble, and the great improvement in general condition had much to do with her rapid recovery. Possibly her age—just arriving at puberty—may have exerted an influence on the case for the better, independent of treatment.

Many theories have been advanced to account for these objective noises. Wieden believed them to be due to a clonic spasm of the stapedius. A number of observers attributed them to spasm voluntary or involuntary, of the tensor tympani. Politzer, Lushka, and others believe them to be due to spasm of the palatine muscles, whereby the anterior wall of the mouth of the Eustachian tube is suddenly drawn away from the posterior, and the noise thus produced. This last view is generally received as sufficient to explain the cause of the peculiar snapping noise in most cases.

Any one interested in this subject will find a chapter devoted to objective noises in the ear in the last edition of Charles H. Burnett's work on the ear, containing the history of several cases coming under his observation and others; together with a complete reference to the literature of the subject.

## AN IMPROVED FORM OF EUSTACHIAN CATHETER.

By H. LINDO FERGUSON, F.R.C.S.J., DUNEDIN, N. Z.

**I**N order to overcome the difficulty of passing an Eustachian catheter in cases where the inferior turbinated bone or a displaced septum encroach on the nasal passage, and to avoid giving pain to the patient when the nasal mucous membrane is much swollen and sensitive, it occurred to me that a soft-rubber catheter might be used, fitted with a straight style, on withdrawal of which the catheter would resume its curve. My idea has been very carefully carried out by Messrs. Tiemann, and the instrument has given very satisfactory results so far as I have yet been able to try it. The catheter is of the ordinary shape, and is of soft red rubber, having inside the stem, and extending nearly to the point, a spiral of fine wire, which prevents the lumen of the instrument being lessened by pressure when in position. There is a straight style of the same length as the catheter, which, when it is introduced, obliterates the curve at the beak. The catheter on the style is introduced like a straight probe along the floor of the nostril, with the side to which the beak tends to curve outward. When the back of the pharynx is felt, the style is withdrawn, and the beak curls round to the mouth of the Eustachian tube. In several cases I have not had to draw it forward at all, for the curve of the beak withdraws the point about the right distance. The instrument passes through very much obstructed nostrils, and gives no pain in cases in which the hard-rubber catheter cannot be tolerated.

TWO CASES OF DEAFNESS FROM CEREBRO-SPINAL  
MENINGITIS, THE ONE ONE-SIDED, THE OTHER  
DOUBLE-SIDED WITH SIMULTANEOUS AFFECTION  
OF BOTH EYES, ENDING IN RECOVERY IN ONE.

By H. KNAPP.

AS the question of deafness from cerebro-spinal meningitis is still greatly debated, and as I do not know whether I shall soon have the time to prepare for publication a rather extensive incident clinical material, bearing on this question, that has come under my observation, I select two cases which may perhaps not be read without interest on account of some unusual and suggestive features which they present.

**CASE I.—One-sided Deafness from Cerebro-Spinal Meningitis.**

May 21, 1877, a twelve-year-old, well-developed, and healthy girl, the daughter of healthy parents, C. H. L., of this city, was brought to my office on account of deafness in the right ear. On examination I found that the child had suffered from cerebro-spinal meningitis when two years old. The disease began with a loud scream at ten o'clock in the morning. Then she suffered a great deal for two weeks, rolling her eyes, had opisthotonus for eleven days, general convulsions off and on, and a high fever. She was very sick for five or six weeks, and exceedingly weak for two months longer. Then she gradually recovered. The defect in hearing was accidentally discovered when she was six years old, the child having had no other illness than the one just described. I found both tympanic membranes normal, the tubes open, pharynx healthy. The watch was not heard on the right side, either when pressed on the auricle or the bones around.

The hearing on the left side was not quite of normal acuteness, namely,  $\frac{1}{4}$  ft. v  $\frac{1}{8}$  ft. Bone-conduction good. The tuning-fork heard only on the left side. When the left ear was held closed and the right turned toward me, she understood ordinary conversation at the distance of several feet. The tuning-fork passed up and down was heard in puffs before the left ear, the same but much feebler before the right.

Six years later, in May, 1883, I examined her again, and found exactly the same condition.

#### REMARKS.

This is the only case of one-sided deafness from cerebro-spinal meningitis which at this moment I recall from my own practice.

There can be little doubt that the disease of which the child had suffered when she was two years old was cerebro-spinal meningitis, for the symptoms were characteristic enough, her physician had diagnosed it as such, and cerebro-spinal meningitis had been epidemic in New York at that time.

The causation of the deafness may, with a probability which approaches certainty, be ascribed to that disease, as the child had not been ill later, and in the pharynx, the E. tubes, and the middle ear no alterations were discernible that might have produced the deafness.

The deafness, it seems, was not complete, as the tuning-fork was heard in puffs, though feebly, when passed up and down the right ear. People totally deaf in one ear hear a tuning-fork which is moved up and down the deaf side, with the healthy ear, but evenly, not with rhythmical reinforcements.

I consider it most likely that during the meningitis both ears were affected, with total or almost total loss of hearing in the right, and only little damage in the left. Cerebro-spinal meningitis is generally regarded as an infectious disease. The visual and auditory organs may be affected by it in two ways: First, by *propagation of the inflammation along the optic and acoustic nerves*, which, for the eye at least, is the rarer way; or secondly, by *metastatic inflammation* of the interior of the eye and ear. For the eye both ways are proven by ophthalmoscopic and microscopic examinations. For the

ear the evidence is not so incontrovertible, but it seems to me sufficiently strong to be accepted by every unprejudiced observer.

In connection with the case under consideration, I want to bring out one point which is of great practical importance, namely, that *metastatic inflammation of the interior of the eye and ear does not, in all cases, destroy the function of the visual and auditory organs*. With regard to the eye, this proposition is supported by an unambiguous case, which I published in the "Transactions of the American Ophthalmological Society," 1882, volume iii., page 396.

Metritis from exposure during menstruation was followed by metastatic irido-choroiditis in both eyes; one eye recovered completely, in the other the disease ran its usual course, ending in phthisis bulbi.

In further support of the above proposition I will relate another case, which will serve, at the same time, to explain by analogy, the occurrence of the deafness in the case under consideration.

**CASE 2.—Bilateral Deafness and Mono-lateral Blindness from Cerebro-spinal Meningitis; the other Eye, Affected also, Recovered.**

Jan. 4, '83, the six-year-old son of J. J., of this city, was brought to me with the following notes from his family physician, Dr. J. Dwyer, of New York: "The little patient, J., was attacked last March with an aggravated form of cerebro-spinal meningitis, and barely escaped with his life. Vision in his right eye was lost early, and I presume his hearing also; but as he was insensible for months, we could not judge of his hearing at that time. He was for three consecutive days in a state of general clonic eclampsia, and remained hemiplegic for months. He has had pretty active treatment,—bromides, quinine, chloral, arsenic, and strychnia, with electricity. His general health has very much improved lately, but there is no improvement in his sight, and his hearing, I fear, is 'completely lost.'"

From the parents and on examination of the patient, I learned the following: Ten months ago the boy, after ailing for some weeks, awoke at two o'clock in the morning with a sudden shock, cried violently, and successively had convulsions, opisthotonus, headache, vomiting, loss of consciousness; he became pale and

reduced to a skeleton ; was in bed six months, had bed-sores. He became deaf on the eighth day ; the right eye was affected at the same time, bloodshot, swollen, with matter in the interior. The left eye was likewise inflamed, fluctuating between better and worse for a few weeks, then got well. The right remained blind. While recovering he was excessively weak, his gait was staggering, and is still unsteady.

At present the left eye is normal in structure and sight ; in particular the optic disc and choroid show no changes. The right is a little smaller than its fellow, and its tension is diminished (T.—1). The iris and lens are pushed toward the cornea ; the periphery of the iris is not retracted. The pupil is irregular, small ; the lens opaque. There is, in this eye, faint but distinct perception of light.

The physical examination of both ears shows no abnormality. The deafness is absolute for all sources of sound.

#### REMARKS.

We see in this case again that the general disease affected both ears and both eyes, destroyed the hearing on both sides, reduced the vision in one eye to faint perception of light, whereas in the other it was completely restored. This case, and very many similar ones, could not, by any manner of means, be explained according to the theory of Voltolini by an otitis interna. The nature of the ear-disease may be left to conjecture, but that of the eye-disease is plainly a purulent uveitis, which, as all know, is either traumatic or metastatic. No kind of otitis interna is known to produce metastatic choroiditis, or any thing like the picture of the disease presented by the case under consideration. The remarkable feature of this case, however, is that both eyes were inflamed and one recovered its sight. This for the eye is not unknown, and there are cases on record (Moos and others) that deafness from cerebro-spinal meningitis is not always total. If, by way of analogy, we assume that the ear-disease is purulent (metastatic) otitis interna, it certainly—like purulent uveitis—is an exceedingly destructive affection, yet there may be a certain number of cases in which recovery takes place before the inflammation has reached such a degree of intensity as permanently to destroy the function of hearing.



REPORT ON THE PROGRESS OF OTOTOLOGY  
DURING THE FIRST HALF OF THE  
YEAR 1884.

Translated by Drs. R. C. BRANDEIS, New York, and C. J. KIPP, Newark, N. J.

I.—NORMAL AND PATHOLOGICAL ANATOMY AND  
HISTIOLOGY OF THE EAR.

By H. STEINBRÜGGE, OF HEIDELBERG.

1. Prof. PAUL ALBRECHT, Brussels. On the morphological importance of the mandibular articulation, of the cartilage of Meckel, and the ossicles of the ear, with an attempt to prove that the scale-like part of the temporal bone of mammals is primarily composed of a squamous and a quadratous portion. Brussels, 1884.

2. Dr. EUGENE FRÄNKEL, Hamburg. On the effect of blunt force upon the external ear, with special consideration of the development of othæmatomata. *Virchow's Archiv.*, vol. xcv., 1884.

3. Dr. A. EITELBERG. Results obtained from the measurements of the weight of the human ossicula auditus. *Monatsschr. für Ohrenheilk.*, 1884, No. 5.

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1. The author premises that the maxillary articulation, from the gnathostomata upward to the mammalia, is considered as a connection between the articulare and the quadratum; that in mammals, on the contrary, anatomists look upon it as uniting the lower jaw with the squamous portion of the temporal bone; with this difference, however, that Gegenbaur, Kölliker, and Wiedersheim do not, as Huxley does, consider the lower maxilla of mammals homologous with the mandible of the lower

vertebrata, but as corresponding to the dental. ALBRECHT then reviews the opinions of the different authors in respect to the origin of the ossicles of the ear from the first and second branchial arches, or from the walls of the labyrinth, and then elaborates his theory that these ossicles are analogous to the former columella; and that this corresponds to the maxillary ligament of fishes. He then criticises the views advanced by Gegenbaur, Kölliker, and Wiedersheim, that the maxillary articulation of the non-mammalian gnathostomata must be analogous to the malleo-incudal joint of the mammalia. Albrecht has never been able to adopt this theory; as a gradual phylogenetic transition of these organs, anatomical or functional, cannot be imagined. He considers the maxillary articulation of mammals not only as analogous to those of the lower vertebrata, but even goes so far as to assert that the temporal bone of mammals is composed of the squamosum and the quadratum; the maxillary joint representing here also an *articulatio quadrato-articularis*. This assertion is based upon a specimen of the temporal bone taken from a child which was born with a hare-lip and a double cleft palate. The right squamous bone was normal, but on the left side the zygoma, or, as Albrecht prefers to term it, the quadratum, remained separated from the real squamous portion. In this case, as in several others quoted by the author, (Meckel, Gruber, Ranke), there was a suture between the two primary elements of the temporal bone, the squamosum and quadratum, which suture Albrecht has also demonstrated upon several monkey skulls. A drawing of the specimen is appended.

2. In order to settle the still open question of the seat and the genesis of othæmatomatous tumors, FRÄNKEL made some experiments upon rabbits of different ages. The auricles of the anæsthetized animals were either subjected to firm pressure between the fingers or struck with a hammer, which invariably caused a bloody tumor. Neither the ages of the animals nor the right or left side, made any difference in the achievement of the desired results. Other experiments were made for the production of abnormalities of the cartilage of the auricle by means of punctures, injections of tincture of iodine, and inunctions of croton oil. The indurations thus caused appeared to facilitate rather than retard the hemorrhagic effusions. But it could not be determined whether maceration or the development of new blood-vessels favored these extravasations. When the swelling begins to form, the first thing noticed is an engorgement of the vessels and an increase of tem-

perature; next come isolated extravasations, which run together; and then we find fluctuating, bluish-red ridges, which are more frequent on the inner than on the outer side, and which, later on, may increase considerably in size. The cutis covering these tumors invariably remains unaffected. The further progress of the disease is as follows: Under expectant treatment the swelling gradually subsides, the color becomes less intense, and in the course of two or three weeks the tumor disappears, leaving either a circumscribed or a diffuse thickening behind. Absorption takes place, either with a disintegration of the red blood-corpuscles or by their being assimilated by the larger cells, which is followed by a transformation into pigment. He never found any cartilage cells in the fluid. In respect to the seat of the tumor, Fränkel says that the extravasation is only occasionally found between the cartilage and the perichondrium. He never found any cavities in the cartilage, while the skin was often lifted off in bladder-like swellings by the effusion. The microscopic examination of these parts after they were hardened in absolute alcohol showed that the process of disease was limited to the subcutaneous cellular tissue and perichondrium, or had extended to the cartilage. The perichondrium, in fact, showed ribbon-like hemorrhagic infiltrations, which may be absorbed without leaving a deposit of pigment. In other parts there was inflammatory irritation, which was manifested by a great development of cartilage cells—this being the cause of the ultimate deformity of the auricle. The cartilage itself almost invariably showed numerous perpendicular solutions of continuity, which involved also the perichondrium. This, as well as the adjoining subcutaneous cellular tissue, becomes entangled in the clefts of the cartilage, and is soon permeated by new cartilage cells and connective-tissue corpuscles. The old cartilage cells, which border on the line of fracture, do not proliferate but degenerate, and a fibrous tissue is deposited in their place. Fränkel sides with Guddens and the other writers who do not believe that an othæmatoma can develop without previous traumatism. In regard to the difference of time that must elapse between cause and effect, he calls attention to the fact, so important in a forensic sense, that twenty-four hours and more may intervene before the swelling appears. The site of the extravasation is either between the skin and the perichondrium or more rarely between the latter and the cartilage.

In respect to treatment, the author proceeded, as follows: He took a rabbit which had othæmatomata on both ears, and treated the one side expectantly and the other by operative means, without noting any difference in the duration of the reparative process. He therefore prefers the former plan, the more so as in the majority of cases there is a simple fracture of the cartilage, which may be transformed into a compound one in case any injury is done to the integument.

3. EITELBERG undertook to determine the weight of the auditory ossicles, which he removed from thirty different subjects, varying in sex and age (these ranged from embryos of the seventh and eighth months to senility). The results which he obtained were as follows: the weight of the malleus has reached its maximum as early as the sixth year of life, then varying from 0.022 to 0.024 *gram*. At this time of life the weight of the incus averages 0.025, and exceeds that of the malleus of the same side by 0.004 *gram*. The weight of the stapes averages 0.002—which is already at its maximum as early as the eighth month of foetal life. The increase in weight of the malleus and incus continues even later than this, although, according to Urbantschitsch, they reach their greatest size very early in life. Eitelberg also found that the quantity of water contained in the hammer and anvil in later months of foetal life and early in infantile life averages 0.006 *gram*., while that of the stirrup amounts to 0.001 *gram*. In the adult the malleus averages 0.004 *gram*., the incus 0.003 *gram*., and the stapes again 0.001 *gram*. of water. In later life, therefore, the solid constituents increase while the fluid grow less. There appears to be no difference in weight in the two sexes, nor was there any notable difference in the right or the left side, with one exception. This last assertion is the more striking, because in twenty cases examined by Urbantschitsch, only five instances were noted in which the length of the malleus was the same on both sides; this would lead one to infer that there might be an inequality in weight also.

## II.—PATHOLOGY AND THERAPEUTICS OF THE EAR.

By A. HARTMANN, BERLIN.

### GENERAL.

1. Dr. TRUCKENBROD. Statistical report of the aural polyclinic of the University of Würzburg. *Arch. f. Ohrenh.*, vol. xx., p. 255.

2. Dr. STACKE. Statistical report of the cases treated in the polyclinic for diseases of the ear at Halle from Oct. 15, 1882, to Oct. 15, 1883. *Ibid.*, vol. xx., p. 267.

3. Report of the department of diseases of the ear of the military hospital at Munich. *Münchener ärztl. Intelligenzblatt*, Nos. 13, 14, 15, 1884.

4. Prof. A. BURCKHARDT-MERIAN, Basle. On the prevention of injuries to the organ of hearing by the noise of railway trains. *Correspondenzbl. f. Schweizer Ärzte*, 1884.

5. Prof. BURCKHARDT-MERIAN. On the injury to the hearing caused by the noise of the railway. *Ibidem*.

6. Dr. FRIEDRICH BEZOLD, Munich. On the affections of the ear in typhoid fever. *Archiv für Ohrenheilk.*, vol. xxi., p. 1.

7. Dr. SCHWABACH, Berlin. On the permanent lesions of the ear caused by the internal administration of quinine and salicylic acid. *Deutsch. med. Wochenschr.*, No. 11, 1884.

8. Prof. BERTHOLD, Königsberg. On autophony. (Communication to the French Otological Association.) *Revue mens. de laryngol.*, etc. No. 4, 1884.

9. Dr. BRUNSWIG. The scotoma of audition. *Ibid.*, No. 2, 1884.

10. Prof. ADAM POLITZER. A new small instrument for the improvement of hearing. *Wiener med. Wochenschr.*, No. 22, 1884.

11. A. KOREN. The diseases of the ear in scarlet-fever. *Magazin for Lägeridenskab*, vol. xii., page 773.

12. Dr. LADREIT DE LACHARRIÈRE. On deaf-mutism. *Annal. des mal. de l'oreille*, etc., Nos. 1 and 2, 1884.

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1 and 2. In the Würzburg clinic 282 patients were examined and treated in the course of two years. A few histories of cases are appended which correspond to the paucity of the material under observation.

STACKE's report of the work done at the clinic at Halle is more valuable. The diagnosis made in a very interesting case of tubercular myringitis could not be confirmed histologically as the patient failed to report himself again. After several futile attempts to remove a small pebble from the auditory meatus, by a physician not connected with the clinic, total facial paralysis set in. On examination no foreign body could be found. There were six

fatal cases, in all of which perforation of the mastoid process had been made. The histories of these cases are given. During the year 600 new cases were treated, suffering from 690 different affections; 181 operations were performed.

3. During the year reported 319 cases of ear-disease were treated in the military hospital at Munich.

4 and 5. The Medical Society of Winterthur petitioned the Federal Railway Department either to replace the steam whistles with some emitting less shrill tones, or to lower their pitch, and not allow them to be opened in the vicinity of the stations, and that signals to be given be lower, shorter, and not so frequent. At the same time BURCKHARDT-MERIAN was requested to investigate the matter. On certain roads the request was complied with; but as the nuisance was not abated on others, B.-M. forwarded a memorial, in the form of a New Year's greeting to the medical superintendent of the Swiss railway system, in which he depicted, in glowing colors, that these steam whistles were annoying; that, in many cases, they were hurtful to the ear, especially to the perception of higher tones; and that, moreover, as has been demonstrated in America, railway traffic need not suffer even though they be entirely done away with.

In his second paper Burckhardt-Merian quotes the reply of Dr. Deucher, the medical official referred to above, who argues in favor of the utility of the steam whistle (although his arguments are not thoroughly convincing), but grants the wishes of the Society of Winterthur, and has also taken the necessary steps to enforce the new regulation. The author again requests that the whistle be used as little as possible; as it may be replaced by bells. If this is not possible he suggests that they be attuned a few octaves lower.

6. As far as the clinical part of BEZOLD's paper is concerned, he, as did Schwartze, recognizes three different affections of the ear as arising in the course of typhoid fever: 1, deafness, without any noticeable evidences of inflammation, which appears to be due to central disturbances; 2, obstruction of the Eustachian tube with the usual consequences; 3, purulent middle-ear disease with or without perforation of the drumhead.

In some cases the affection of the acoustic nerve appears during the first few days of the disease. Obstruction of the Eustachian tube was only observed once in fifty cases of disease of the ear. Acute otitis media was noted in four per cent. of all the cases of

typhoid, but did not set in before all the constitutional symptoms had subsided, generally between the twenty-fifth and thirty-fifth day of the disease. The course run by the acute otitis is given in detail. The inflammatory symptoms are generally quite intense, and the mastoid process is frequently and markedly affected. The perforation of the drumhead is generally found in the posterior half of the membrane. Bezold believes that the acute otitis media may be due : first, to an extension of the inflammation from the naso-pharynx ; secondly, to the propagation of septic matter from the naso-pharynx into the tympanum ; thirdly, by embolism of the vessels ramifying in the mucous membrane of the middle ear, either due to endocarditis and thrombi from the left ventricle, or to peripheric purulent foci.

7. SCHWABACH reports two cases which go to show that, in some instances even moderate doses of quinine and salicylic acid may be followed by permanent disturbances. On the other hand, even very intense and chronic deafness and subjective noises may be amenable to treatment. The benefit derived, in the first case, from treatment, and the fact that the vertigo and the subjective noises increased during damp, raw weather, lead Schwabach to believe that this was an affection of the middle ear complicated with an increase of pressure of the stapes upon the intralabyrinthine fluids. In the second case (after the administration of only three doses, one gramme each, of the salicylate of soda) the subjective noises remained even after the hearing was restored ; and this leads him to conclude that there must have been a permanent irritation of the acoustic nerve.

8. BERTHOLD carefully considers the pathology and therapeutics of autophony. In endeavoring to explain the cause of this phenomenon, he arrives at the conclusion that it is due to the fact that, of the four factors which ordinarily regulate, *i. e.*, lessen or suspend, the vibrations and resonance of the drumhead, when the tube is patent, the first three are impaired in their action, and even the fourth cannot exercise its function. These four factors are : first, the confinement of air ; second, the tension of the drumhead by the ossicles ; third, the incompressibility of the labyrinthine fluids ; and fourth, relaxation of the tensor tympani and contraction of its antagonist, the stapedius muscle. Appended hereto are reports of cases and clinical observations of other authors.

9. BRUNSCHWIG found in the case of a young man who at-

tended Baratoux's clinic for the relief of deafness, and whose drum-heads on both sides showed the characteristic symptoms of a healed otorrhœa, that he could hear the watch, on the right ear, at a distance of from 20 to 16 *cm.*, but did not hear it at a distance of from 16 to 13 *cm.*, but from this distance to actual contact he was able to hear it distinctly. Further tests afforded similar results. This unusual phenomenon, which he failed to observe again in this patient or in any other case, he considers analogous to the defects in the visual field, and calls it scotoma of audition, and hopes some attention will be paid to the subject.

10. The results which POLITZER obtained from the little instrument previously recommended by him were not entirely satisfactory. He has therefore devised a new one, which has answered very well in a large number of cases which failed to be relieved by any other therapeutic device. By means of this new instrument the vibrations of the cartilage of the auricle are directly transmitted to the membrana tympani by means of an elastic conductor. Politzer accepts it as an undoubted fact that the elastic cartilage favors the transmission of sound-waves to the bones of the head. In order to connect the drumhead with the concha, a very small drainage-tube, whose inner end, by being split open, formed a narrow disc, was found most serviceable. The outer end of the tube is connected with a caoutchouc membrane, from 1 to 1.25 *cm.* in diameter, which is inserted into the concavity of the concha. This instrument can be inserted by the patient himself. It affords relief not only by facilitating the transmission of sound, but also by the pressure which it exerts. Improvement of hearing was noted in all cases of disease of the middle ear, in which disturbances of the conduction of sound in the tympanum were the cause of deafness.

11. KOREN tabulates 426 cases of scarlet-fever, and appends remarks on the statistics of deaf-mutism in Norway. He lays stress on the following: otitis externa arises when the exanthem extends to the meatus, in the same manner in which it develops in erysipelas. This affection never manifests itself spontaneously. In forty-five cases (10.56 %) there was otitis media, which Koren attributes solely to extension of the scarlatinal angina through the Eustachian tube. One case of otitis interna is reported: a girl aged seven years, who became totally and permanently deaf during the first days of her illness.

12. LADREIT DE LACHARRIÈRE gives us a general review of



the diffusion, etiology, and pathological anatomy of deaf-mutism. He believes that acquired deaf-mutism is more frequently found in France than the official reports would lead one to believe. Among one hundred cases he found only twenty-one which were congenital. It seems that he arrived at this conclusion by excluding from the category of congenital deaf-mutes all those cases in which he found pathological changes in the drumhead. The different diseases which may cause deaf-mutism are carefully described. In the second part of his article he describes the mode of instruction employed in France, its development at the time of the Abé de l'Épée, and the changes that have taken place since the introduction of the German method, as recommended by the Congress at Milan. Since 1880 new pupils are separated from old ones and are taught articulate language.

## EXTERNAL EAR.

13. Dr. STETTER, Königsberg. On the operative removal of congenital malformations of the auricle. *Arch. f. Ohrenheilk.*, vol. xxi. page 92.

14. Dr. HESSLER, Halle. Gumma of the auricle. *Ibid.*, vol. xx., pag. 242.

15. Prof. MOOS, Heidelberg. A case of neuralgia, most marked in the second branch of the fifth nerve, due to an exostosis in the external auditory meatus. *Berlin. klin. Wochenschr.*, No. 8, 1884.

16. J. NICOLAYSEN. Foreign body in the cavity of the tympanum; resection of the annulus tympanicus. *Norsk Magazin for Lægeridenskab*, vol. xii., pag. 799.

17. DESMOULIN. A case of rupture of the drumhead from a box on the ear. *Gaz. méd.*, 1884 pag. 222.

13. The deformity operated on by STETTER, was due to a folding of the auricle, from above and behind, downward and forward, over the external auditory meatus. The operation resulted in a permanent exposure of the meatus and an improved shape of the auricle.

14. After great swelling of the auricle, a lardaceous ulcer made its appearance. By means of antiphlogistic treatment HESSLER succeeded in bringing about a temporary improvement. Later, the cartilage was exposed, and, chloroform being administered, a piece about the size of a dime was removed. Other operations were also necessary, but when a gumma made its appearance on the tibia iodide of potassium was administered and the disease of the auricle was cured.

15. Moos' paper is a reprint of an address delivered in the Otological Section at the Congress of Naturalists and Physicians, held at Freiburg (see report, vol. xiii).

16. NICOLAYSEN removed a small pebble from the middle ear by resecting the annulus tympanicus with saw and chisel.

17. The case described by DESMOULIN is a rupture of the membrana tympani in consequence of violent compression of the air in the meatus due to a box on the ear. Immediately after the blow the patient felt violent pain in the ear and head and shortly after a purulent otitis media set in, which persisted for six weeks, while the loss of hearing and a large perforation of the drumhead became permanent. Singular to say, in the entire report, which enters minutely into all possible details, there is not a word said about the condition of the drumhead; the existence of a perforation is inferred from the sound made by the air passing through the ruptured drumhead and the fact that the current is felt at the meatus when Valsalva's method is employed (!).

#### MIDDLE EAR.

17 a. MÉNIÈRE. De la dilatation intermittente et progressive de la Trompe d'Eustache. (On the intermittent and progressive dilatation of the Eustachian tube.) *France méd.*, p. 129, 1884.

18. Dr. BARATOUX. De l'électrolyse ou de la galvano-caustique chimique de la trompe d'Eustache. On the electrolysis or chemical galvano-caustic treatment of the Eustachian tube. *Revue mens. de laryng., etc.*, No. 6, 1884.

19. Prof. VOLTOLINI. On the catheterization of the Eustachian tube in cases of palatum fissum, and on the inspection of the nasal cavity from in front while it is illuminated from behind. *Monatsschrift f. Ohrenheilk.*, No. 1, 1884.

20. VICTOR LANGE. Bedrag til Laeren om der acute suppurative Betaendelse i Mellemoeret. Contribution to the doctrine of the acute purulent inflammation of the middle ear. Copenhagen, 1884.

21. Dr. K. BÜRKNER. The treatment of otorrhœa. *Berliner klin. Wochenschrift*, No. 1, 1884.

22. Dr. HESSLER, of Halle. Pyæmia from acute suppuration of the middle ear. *Archiv f. Ohrenheilk.* vol. xx., p. 223.

23. Prof. GRUBER, Vienna. The pathogenesis of inflammations in the region of the parotid gland and the lateral wall of the pharynx. *Wiener allgem. med. Zeitung*, No. 6, 1884.

24. DR. WILHELM KOSEGARTEN, of Kiel. On an artificial improvement of hearing in cases with large perforation of the drum membrane. A treatise for the attainment of the *venia legendi* for otology. Kiel, 1884.

25. O. WANSCHER. Nogle Tilfælde af Resektion, etc. Some cases of resection of the mastoid process with remarks as to method and indication. *Hospitals-Tidende*, January 23 and 30, 1884.

26. DR. JACOBV, of Breslau. On the operative treatment of caries of the temporal bone. Sixteen cases. *Archiv f. Ohrenheilk.*, vol. xxi., p. 54.

27. Prof. VOLTOLINI. On tubercle-bacilli in the ear. *Monatschrift f. Ohrenheilk.*, No. 2, 1884.

28. DR. L. KATZ, of Berlin. On croupous inflammation of the middle ear in scarlet-fever. *Berliner klin. Wochenschrift*, 1884.

29. AUGUST LUCÆ. A method of mechanical treatment of chronic disturbances of mobility in the sound-conducting apparatus of the organ of hearing. *Archiv f. Ohrenheilk.*, vol. xxi., p. 84.

17a. MÉNIÈRE praises bougieing of the tubes, which he has practised successfully for fifteen years. He describes his method, which differs from the one usually employed in this, that instead of withdrawing the bougie, he causes it to slide out of itself by bending forward the patient's head. This is to be done five to twenty minutes after its introduction. In appropriate cases the bougies may be coated with medicinal substances.

18. BARATOUX, in the introduction, mentions the attempts previously made to employ electrolysis in the treatment of contractions of the Eustachian tube. He uses a hard-rubber catheter having in its enlarged end a hole through which an electrode of silver or platina is introduced. The electrode may have at its end an olive or a triangular loop. The second electrode is placed on the mastoid process. The strength of the current must not exceed five milliampères, and the application should not last more than four to five minutes. It this way an eschar is formed which leaves a thin cicatrix. Baratoux uses the electrolysis or the chemical galvano-cautery, as he calls it, only in cases which have resisted the other methods of treatment. Baratoux's method of making perforations in the drum membrane and keeping them open will require further confirmation.

19. In one of VOLTOLINI's patients, who was afflicted with hardness of hearing and otorrhœa, and a cleft of both the hard

and the soft palate, the posterior lip of the tube, but not its mouth, could be seen when the patient's head was thrown far backward. As in consequence of this abnormality Politzer's method succeeded only partly, or not at all, it became necessary to resort to catheterization, which could be accomplished only under illumination. With an instrument with a long beak the tube could, however, be reached also from the mouth. (In cases of cleft palate catheterization can be accomplished with certainty and without difficulty under illumination from the mouth with a catheter which has been bent into the form of an S.—REVIEWER.) In this connection Voltolini describes a method of examining the nose, which can be carried out sometimes also in normally built individuals by the aid of an assistant. A spring speculum is placed in the anterior opening of the nose, and a rhinoscopic mirror illuminated by a reflector in the pharynx. It is said that this method enables one to form easily an opinion of the thickness of the structures. In this Voltolini is in error, as the more or less complete transparency of the structures depends less on their thickness than on their character.

20. The very complete description of the acute inflammation of the middle ear given in LANGE's monograph is based on the literature on the subject as well as on his own experience.

21. BÜRKNER states that he has employed a solution of corrosive sublimate in the treatment of middle-ear suppuration and has found it useful. In his opinion it is not, however, preferable in general to boric acid and nitrate of silver. In some cases brilliant results were obtained from it after long-continued but unsuccessful treatment with boric acid and nitrate of silver.

22. HESSLER describes a case of pure pyæmia supervening on acute inflammation of the middle ear. A relapse of the inflammation with bulging of the drum membrane caused the author to abstract blood by leeches and to make an extensive paracentesis. Shortly afterward the patient complained of fever, and the temperature rose to  $40^{\circ}$  ( $104^{\circ}$  F.). No rigors and no fever delirium. There were no marked inflammatory symptoms about the ear itself. The secretion was of a greenish color and offensive only for a short time. The subsidence of the fever was rapidly followed by complete recovery. Hessler thinks that an infection through the incision in the drum membrane can be excluded. He believes that the absorption of phlogogenic purulent matter resulted from the reduction of tension in the blood-vessels, which

followed the abstraction of blood from the infra-auricular region. As a consequence, purulent thrombi were drawn from suppurating veins into the general circulation.

23. GRUBER points out that the fissura Glaseri and the clefts and defects in its continuation in the temporal bone connect anatomically the middle ear with the parotid gland and the lateral wall of the pharynx. This explains why at times inflammations of the middle ear extend *ex contiguo* to the parotid region without the participation of the external canal in the disease, or, as in mumps, the inflammation travels to the middle ear. Gruber has also seen cases in which the inflammation crept from the mastoid process to the parotid region without involving the external canal. Frequently the fissura Glaseri is not completely limited upward and outward by the union of the upper margin of the annulus tympanicus with the outer plates of the horizontal squamous portion, and in such cases the inflammation may extend above into the groove under the ascending ramus of the inferior maxillary bone and below to the lateral wall of the pharynx.

24. KOSEGARTEN has frequently insufflated powdered alum in cases with large perforations, but with little secretion, and has observed that this treatment is often followed not only by a cessation of the discharge, but also by a marked improvement in hearing. The powder forms a disc which acts as an artificial membrane. The disc may remain intact for many months. Kosegarten made various experiments to ascertain the cause of the improvement in hearing. The improvement followed the application of various powders, and also the injection of ether, after its evaporation. If iodoform were added to the ether a still greater improvement was produced by the layer of this substance, which remained after the ether had evaporated. Other irritants, such as water injections, the interrupted current, and the sound of a bell also produced an improvement in hearing, so that it must be assumed that these irritants increase the functional activity of the nervous apparatus. Artificial hardness of hearing he could produce by closing the external canal for a long period; this impairment of hearing was, however, relieved at once by the application of a strong acoustic irritant (the bell).

25. WANSCHER describes two resections of the mastoid process, made by himself.

1. A student, twenty-two years of age. For six months, hardness of hearing and pain deep in the right ear. No subjective noises.

Fever at times. Membrana tympani slightly reddened, otherwise normal. Eustachian tube and middle ear the same. In the mastoid region there is a gland the size of a pea. An incision was made through the skin and the gland enucleated. It proved to be unmistakably tuberculous. Four days later resection of the mastoid process; long incision through the skin and removal of the outer wall by the gouge. About  $\frac{3}{4}$  cm. below the outer surface a mass of tuberculous granulations was found, which was removed with the sharp spoon. Corrosive sublimate and iodoform were used in the after-treatment. Cure in six to eight weeks. No pain after hearing was restored.

2. A soldier, twenty-three years old; previously healthy. Two months after the sudden occurrence of an affection of the left middle ear, he had exceedingly severe pain in the left half of the head; at the same time an extensive œdema in the left temporal region appeared with impairment of vision, which, it is alleged, gradually increased to total blindness; no strabismus, no diplopia, and no exophthalmos. Normal reaction of the pupils and absolutely normal fundus oculi. Profuse otorrhœa; some swelling of mastoid region. A considerable quantity of pus was evacuated by the operation. The mastoid cells were filled with a mass of soft granulations, which were in part scraped out with the sharp spoon. After the operation: good health, absence of headache, restoration of sight. On the day after the operation erysipelas developed, which lasted for six days, and gave rise to an abscess under the temporal muscle. The abscess was evacuated by an incision. Fourteen days after the operation the patient was out of his bed.

Both operations were made under ether. The first case was diagnosed by the author a tuberculous mastoiditis, and the result showed that the diagnosis was correct. In the second case the diagnosis was self-evident. The disturbance of vision the author considers a reflex amblyopia. In his remarks on these cases the author gives a short historical review of the operation, refers to the dangers of the same, and mentions the anatomical observations of Bezold, Hartmann, and others. He also emphasizes his method of operation: the removal of layer after layer of the outer wall of the mastoid by means of the gouge. In his critical remarks on the utility of the operation he lays great stress upon the revulsive method, and closes with the suggestion that all persons suffering from chronic otorrhœa should be made acquainted with the dan-

gers attending an expectant (?) treatment, and the chances of an operation (resection) be pointed out to them. (Victor Bremer, REVIEWER).

26. JACOBV reports the histories of 19 cases of caries of the temporal bone in which he performed surgical operations; 14 of the cases recovered, 5 died. In most of the cases the operative procedure consisted in making an opening in the mastoid process by means of the chisel; in one case he made a paracentesis of the drum membrane and in another he destroyed a polypus with the galvano-cautery. No general conclusions are drawn from the observed cases by the author.

27. VOLTOLINI reports on tubercle-bacilli in the ear. In his first paper he dwells on the prognostic connection between suppuration of the ear and latent or apparently improving phthisis of the lungs, to which he has called attention for a long time. In the secretion removed with all possible precaution from the ear of one of these cases he found tubercle-bacilli. The great diagnostic value of the bacilli is thus proved. In the second paper he describes at length the method of examination, but reserves a fuller account of his observations for some future occasion, when a larger number of cases have been examined. As the secretion of the ear glands is not easily stained and interferes with the examination, he first removes the secretion which has accumulated in the external canal, and then obtains some of the pus from the tympanic cavity on a small piece of sponge. This secretion is then examined according to the well-known method of Ehrlich-Rindfleisch with an immersion lens and Abbé's condensor. "This examination is often very difficult," and "such difficult examinations had better be left to the specialist." It is uncertain whether he means that only the specialist is able to examine dried preparations for bacilli (which seems improbable) or that only a specialist is likely to be the possessor of an oil immersion lens and an Abbé's condensor, for we cannot understand what other difficulty there can be that can be overcome only by a specialist.

28. KATZ reports a case of diphtheria of the middle ear, which occurred simultaneously with diphtheria of the pharynx during scarlet-fever. Death from nephritis. No autopsy.

29. As in the application of the air douche in diseases of the sound-conducting apparatus, the effect of the air pressure is chiefly dependent on the behavior of the drum membrane, which often is a hindrance to the action of a sufficient pressure on the ossicles,



LUCÆ determined to attack the ossicles themselves by instrumental means, through pressure on the short process. The instrument used for this purpose consists of a steel rod with a small hollow cone for the reception of the short process at the upper end, which rests in the handle upon a spiral spring. This spring pressure-probe is placed upon the short process, and then piston-like movements are made. A detailed statement of the experiments made will be published later. The results obtained by this treatment were as follows: no improvement, 7; good, 10; very good, 13.

#### NERVOUS APPARATUS.

30. Prof. MOOS, of Heidelberg. A case of partial labyrinthine affection after mumps. *Berliner klin. Wochenschrift*, No. 3, 1884.

31. Dr. KIRCHNER, of Würzburg. On cerebro-spinal meningitis, and its significance with regard to the organ of hearing. *Deutsche med. Wochenschrift*, No. 5, 1884.

32. Dr. HARDWICKE, of Sheffield. Épanchement sanguin, etc. Traumatic effusion of blood in the inner ear. *Annales des mal. de l'oreille etc.*, No. 2, 1884.

30. MOOS adds to the long list of recently published cases of disturbances of hearing after parotitis, another observed by himself (his third). The peculiar feature of this case was that the patient, a boy thirteen years of age, had been totally deaf in the left ear, and almost deaf in his right ear for nine years; the deafness followed some febrile affection; his drum membranes were markedly changed. After the mumps, which affected both sides, he became also totally deaf in the right ear. Bone-conduction and the perception for low tones remained. No other symptoms were present. From this it seems probable that an exudation occurred in the labyrinth, whereby the functions of the greater part of the same were suspended. In opposition to the view which has heretofore prevailed, that a metastatic exudation caused the deafness, Moos directs attention to the explanation given by Lemoine and Lannois, who, by reason of the simultaneous occurrence of both affections, come to the conclusion that parotitis is an infectious general disease with co-ordinated local manifestations.

31. KIRCHNER, after some general remarks on this subject, describes a case of epidemic cerebro-spinal meningitis, in which a gradual increase of hardness of hearing occurred parallel with a



gradual change in the form of the disease from an acute to a chronic one, and an improvement in hearing in the course of healing. In this case as in three others which are briefly described, the remaining impairment of hearing was greater in one ear than in the other. Kirchner calls attention to the fact that the tympanic cavity also is often involved in these cases, and in conclusion recommends some therapeutic measures for the treatment of otorrhœa which present no novel features.

32. HARDWICKE describes the case of a young man, seventeen years of age, who, four days before he came under observation, had been struck by a cricket-ball on the right ear, which had been totally deaf since. The objective examination revealed no abnormality. The treatment consisted in leeches, blisters, and iodide of potassium. Complete restoration of hearing eight days later.

NOSE AND NASO-PHARYNGEAL CAVITY.

33. DR. PAUL HEYMANN. The examination of the nose and the naso-pharyngeal cavity. *Deutsche Medicinal-Zeit.*, 1884.

34. DR. HERING, in Warschau. De l'emploi de l'acide chromique, etc. On the use of chromic acid for cauterization in diseases of the nose, pharynx, and larynx. *Revue mens. de laryng.*, Nos. 5 and 6, 1884.

35. DR. KIESSELBACH, in Erlangen. On spontaneous epistaxis. *Berliner klin. Wochenschrift*, No. 24, 1884.

36. Prof. SOMMERBRODT, in Breslau. Report of cures of pathological conditions, the result of reflex processes originating in the nose. *Berliner klin. Wochenschrift*, No. 10, 1884.

37. DR. FRÄNKEL. Demonstration of a case of spasm of the facial nerve, cured by applications to the nose. *Deutsche med. Wochenschrift*, No. 25, 1884.

38. DR. JACQUEMART. Amas considérable de concrétions calcaires, etc. Considerable deposit of chalky concretions in the nose. *Annales des. mal. de l'oreille*, etc., No 1, 1884.

39. W. BRÜGELMANN, in Inselbad. On the nature and treatment of ozæna. *Monatsschrift f. Ohrenheilk.*, No. 5, 1884.

40. DR. THEODOR HERING, in Breslau. On pharyngomycosis leptothricia. *Zeitschrift f. klin. Med.*, Bd. vii., Heft. 4.

41. DR. BENSCH, in Berlin. A new attachment of Voltolini's palate hook. *Monatsschrift f. Ohrenheilk.*, No. 5, 1884.

33. HEYMANN gives a complete description of the method of

examining the nose and naso-pharyngeal cavity, but offers nothing new. The paper is accompanied by a number of illustrations, mostly of antiquated nose specula.

34. **HERING** describes fully the application of chromic acid in the diseases of the nose, pharynx, and larynx. He believes that this remedy, which in his opinion is a most excellent one, is but rarely used, because it cannot be conveniently applied and the dose not strictly regulated, and because of fear of intoxication. Hering fuses the chromic acid upon the end of a silver probe or a glass rod, in the same way as is done with the nitrate of silver. Applied in this way to the mucous membrane of the mouth or the pharynx, the chromic acid causes but little pain. Hering has never seen symptoms of poisoning when it was used with proper precautions. The application of the acid is to be followed by rinsing of the parts with water, and gargling, and a solution of soda should be drunk if any of the acid has been swallowed. Hering has derived most benefit from chromic acid in cases of chronic nasal catarrh with swelling and moderate hypertrophy of the turbinated bones; here it surpassed all other remedies previously used. It brings about a rapid cure without causing severe pain.

35. **KIESSELBACH** confirms in his paper the statements made by the Reviewer some time ago with regard to the source of spontaneous bleeding from the nose. In most cases the source was found in the anterior lower region of the cartilaginous septum; more rarely the bleeding points were seen as far back as the upper margin of the septum cartilagineum; and in only one case further back than the anterior end of the middle turbinated bone, which in this case, however, extended uncommonly far forward. It is thus seen that in all of Kiesselbach's cases the hemorrhage came from the region of the cartilaginous septum, although in two of the cases it came also from the junction of the septum with the floor of the nose, in the vicinity of the foramen incisivum. The treatment pursued by Kiesselbach is the same as that recommended by the Reviewer some time ago, namely, the arrest of the hemorrhage at its source by cotton tampons, the chloride of iron, or the galvanic cautery.

36. **SOMMERBRODT** reports in detail a case in which there were present—in addition to the reflex phenomena of a vaso-dilatatory nature (œdema of the face and the conjunctiva) which have already been described by Hack, and are supposed to start from the erec-

tile structures in the nose,—paroxysms of sneezing, and profuse secretion from the nose and the tear-glands; also reflex dilatation of the blood-vessels of the mucous membrane of the bronchi, presenting the picture of a chronic bronchitis; also reflexes which caused vomiting; and reflex phenomena of the nerves of the skin, such as chilliness, rigors, and blanching of the skin. The case was cured by the destruction of the erectile structures by the galvanic cautery. The same procedure he adopted in a case of functional phonic glottis spasm, depending on the same cause; also in eleven cases of asthma, in two of which, however, according to the patients' statements, the affection was limited to the side of the chest corresponding to the affected nasal cavity. In a case of whooping-cough, Sommerbrodt brought about a typical paroxysm by cauterization of the turbinated bone; subsequently this case was cured by further treatment of the nasal disease. Sommerbrodt always limits the cauterization to the surface.

37. FRÄNKEL showed to the members of the Berlin Medical Society a case of spasm of the facial nerve, which had been cured by applications to the nose. The spasm had been of four years' duration, and had been accompanied by pain in the nasal cavity of the same side. The introduction of a nasal speculum into the aperture of the nose brought on a severe attack of spasm, and touching of the nasal mucous membrane did the same. The spasm was cured by repeated applications of the galvanic cautery.

38. JACQUEMART's patient suffered from occlusion of the left nose, a discharge from the same, and frequent epistaxis. The disease began in 1862. The examination revealed the presence in the nose of a dirty grayish body, which felt hard to the touch. Jacquemart thought that he was dealing with a carcinoma or an osteosarcoma. In the attempt to remove this mass piecemeal with the galvano-caustic loop, several solid fragments came away, which, as further examination showed, had formed about a fruit-seed.

39. Starting from the erroneous supposition that it is the almost general belief that ozæna is caused by a purely specific disease of the nasal mucous membrane, BRÜGELMANN gives his views of this disease. He believes that ozæna represents a suppuration of the turbinated bones and their covering, but that the peculiar odor is an attribute of the suppuration and not of the ozæna. In this view Brügelmann is in opposition to all authors

who are accustomed to examine the nose thoroughly in cases of ozæna. His treatment consists in the removal of the crusts with a solution of the chlorate of potassa. Tamponing of the nose is in his opinion a mistake (!).

40. HERING adds six new cases of his own to the eight cases of pharyngomycosis leptothricia already on record, and from these fourteen cases draws a picture of the disease. In this affection the tonsils and the base of the tongue are the seat of whitish, soft or horny, pedunculated nodules or excrescences, which are found either in the crypts of the tonsils, the papillæ circumvalatæ, and mucous glands, or on the surface of the mucous membrane. They are very resistant, are easily re-formed, cause but slight local disturbance, and only very rarely an inflammatory reaction. In one half of the cases the tonsils alone were affected; in most cases the disease was bilateral. It is seen in both sexes and at all ages. This affection may be mistaken for diphtheria, follicular angina, and the formation of calcareous concretions in the crypts. It differs from the first-named disease by the absence of febrile symptoms and other constitutional disturbances; from the second in the absence of fever and its greater resistance; from the third it can only be distinguished on microscopical examination. This shows in the particles the presence of numerous leptothrix rods embedded in a finely granular mass, both of which are stained blue by Lugol's solution. (Following this is a minute statement of the still mooted points with regard to the nature and growth of this fungus.) In nearly one half of the cases this affection causes no trouble whatever, and in the other only insignificant local disturbances, but no constitutional trouble. In cases in which such were present they were probably caused by too active treatment. Therapeutic measures are but seldom called for. The removal of the tonsils, or destruction of the foci with the galvano-cautery, and the avoidance of all irritating applications is all that is needed in any case. In a case which had led to various diagnostic errors the disease yielded rapidly to the smoking of segars.

41. BENSCH describes the manner in which he attaches Voltolini's palate hook to Asch's tongue depressor.

## REVIEWS.

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**The Diseases of the Ear and their Treatment.** By ARTHUR HARTMANN of Berlin. Second revised and enlarged edition. Berlin, 1884. Reviewed by Gustav Brunner, of Zürich.

The necessity of a second edition within the short period of two years is probably the best possible evidence that the book under review, with its concise and yet abundant and lucid statement as compared with the more exhaustive text-books, has supplied an actual need. In this edition the author has endeavored to fill here and there a vacancy and to keep abreast with the advances since made, without destroying the compendious character of the book (240 pages instead of 210 in the first edition), and in this I am pleased to say he has succeeded admirably. There is scarcely a chapter in the book that has not been corrected, and a new one on the prevalence, ætiology, and prophylaxis of ear diseases has been added. Paper, print, and illustrations are very good, and the book can be recommended to students and general practitioners as an excellent compend of otology.

**A Treatise on the Diseases of the Ear.** By Dr. VICTOR URBANTSCHITSCH. Second, entirely re-written, edition. With seventy-three wood-cuts and eight plates. Vienna and Leipzig, 1884: Urban & Schwartzberg. Reviewed by J. Gottstein of Breslau.

The favor with which Urbantschitsch's "Treatise on the Diseases of the Ear" was received on its first appearance will, in our opinion, be bestowed in an undiminished measure on its second edition. Severe objectiveness, lucid, transparent statement, and complete mastery of the rich material are qualities which create a favorable impression and secure a thorough success.

The arrangement of the subject-matter is, on the whole, the same as in the first edition, but the marginal headings are omitted, and

a complete statement of the sources of the quotations from the works of other authors given in the text is given in the foot-notes. We regard these changes as advantageous, yet believe that the author has with too great minuteness referred to all that has been thought and written in our science, and that it would have been better if much of what is worthless and discarded had been allowed to pass into oblivion. Whilst the author's endeavor to do justice to the work and the performances of others is worthy of acknowledgment, we could have wished, also, that the author had more clearly defined his own position on many questions; frequently one is in doubt whether he only gives an historical statement of the opinions of others, or whether he adopts them as his own. The author's experience is so large, and the reputation he has gained by his scientific work so excellent, that a little more subjectivity would have given his book a greater charm. Why the author has omitted the brief yet sufficient description of the rhinoscopia anterior and posterior contained in the first edition, and in this edition dismisses the subject in a few words, accompanied by an illustration of the rhinoscopic image and the nasal speculum, we cannot understand. He recognizes full well the importance of the affections of the nose and the naso-pharyngeal space with reference to diseases of the ear; he devotes two well-written chapters to the general therapeutics as well as the special pathology and treatment of the diseases of the nose and the naso-pharyngeal cavity; nay even the vignette on the title-page of the book represents, in a measure, as a token of the intimate relations existing between ear-affections and the diseases of the nose, a rhinoscopic image, and yet no directions are given for the examination of these cavities. This, it seems to us, is unjustifiable.

No less do we miss in this edition the scheme for recording the examination of patients, as it presented an easy survey, especially to beginners, of all the points to which, in the examination of patients, especial attention should be given. The directions for dissecting the ear are also wanting.

In the special part of the book the author has with painstaking care, embodied the writings of others which have appeared since this book was first published. We can call attention to only a few points of the rich material.

The author has abandoned early incisions in acute inflammations of the external canal, as he has become convinced that the incision, which in most cases is very painful, is usually followed neither by

marked relief nor a rapid subsidence of the inflammatory symptoms.

As regards the furunculous inflammations, we can confirm this from personal experience.

Among the means for facilitating the removal of fixed, swollen, vegetable foreign bodies from the external canal, we miss Zaufal's method of causing a reduction of the volume of the body by extracting water from it by alcohol or glycerin.

At the end of the chapter on the Eustachian tube a short account is given of the pathological conditions of the nose and nasopharyngeal space of special interest to the aurist. The anatomy and physiology of these parts have been omitted from this edition, for which we are unable to find a valid excuse. The illustration of the rhinoscopic image in this edition (fig. 56, p. 172) appears to be less accurately drawn than that which is found in the first edition (fig. 57, p. 248).

The statement, that the Reviewer, in cases of ozæna, keeps the tampons in the nose for twenty-four hours, is erroneous. He leaves them there only from two to six hours, according to the severity of the case, and, if necessary, introduces them several times a day.

For the removal of nasal polypi the author recommends the galvano-caustic snare, "and only in the absence of a galvano-caustic battery are the polypi to be removed by the simple snare instead of forceps which cause much more pain." We prefer for almost all cases the simple snare to the galvano-caustic loop. If the author means to say that a speculum is not always required for the operation, we cannot agree with him, as it is impossible to guide the snare with certainty, unless the nostril is sufficiently dilated and the cavity well illuminated by the reflector.

In the chapter treating of the tympanic cavity, fig. 58 of the first edition, representing a section of a rabbit-embryo seventeen days old, intended to illustrate the development of the Eustachian tube, has been very properly omitted; likewise fig. 64 (the place for tying the carotid artery, after Albert).

Unfortunately our pathologico-anatomical knowledge of the inflammations of the middle ear is still too imperfect to base upon it a scientific or available division of the inflammations. The author in this, as in the first edition, divides the inflammations in two chief groups.

1. The superficial inflammations (simple catarrh, croupous inflammation, desquamative inflammation).

2. Deeper-seated (phlegmonous) inflammations (simple phlegmonous, purulent phlegmonous, acute and chronic, the diphtheritic inflammation).

Setting aside the term tympanitis, which aurists have very properly declined to adopt, and the use of the expression inflammation of the tympanum for inflammation of the tympanic cavity, which cannot be approved, we do not regard this division a happy one. It has neither a pathologico-anatomical basis nor a clinical one, and offers no practical advantage. How, for instance, can the croupous inflammation be separated clinically, or even pathologically, from the diphtheritic inflammation, especially when the author himself reports that croupous membranes have been found on the mucous membrane of the tympanic cavity in cases of diphtheria of the pharynx? How can the author maintain that the desquamative inflammation is an independent form of the superficial inflammations, when he concedes that it is not unfrequently (according to our experience always) associated with the deeper-seated inflammations?

For the present, we consider the classification of the inflammations of the tympanic cavity according to the nature of the secretion, as answering best the practical requirements.

The description of the phenomena of the different inflammations is clear and comprehensive; the separate symptoms receive attention according to their pathological dignity. The effect of the purulent inflammation of the middle ear on the walls of the tympanic cavity and on the adjacent parts and its influence on the general health are discussed in a striking and exhaustive manner. As regards the latter, the author believes that the purulent inflammation of the tympanic cavity assists in the development of pulmonary or general tuberculosis, while in the first edition he assumed that it might be the exciting cause of the tuberculosis.

The assumption that otorrhœa assists in the development of the tuberculosis is scarcely reconcilable with our present view of the genesis of this disease. We believe, moreover, that the otorrhœa is much more frequently the result of the tuberculosis than is generally believed at present, and we never omit to examine carefully the organs of respiration in all cases of otorrhœa, the ætiology of which is obscure. It remains for further pathologico-anatomical investigation to determine whether or not a tuberculous otitis exists.

The tenotomy of the tensor tympani in cases of contraction of



its tendon can, according to the author, produce a permanent improvement of the symptoms of vertigo and subjective noises, and sometimes also of the hardness of hearing; in other cases the effect is, however, only transient. The statement contained in the first edition, that the operation sometimes exerts a favorable influence on the ear not operated on, is not found in this edition.

With regard to the question whether the operation for opening the mastoid process is indicated as frequently as it is performed by some authors, Urbantschitsch expresses no decided opinion. This subject is, moreover, disposed of in comparatively few words.

The "inner ear" is discussed the more copiously, and in the anatomical part, and especially in the physiological portion, much might have been shortened without doing harm. The two illustrations (figs. 69 and 70) of a cross-section of a whorl of the cochlea of a Guinea-pig (!) seem to us of doubtful value to the otologist. As psycho-acoustic phenomena are briefly mentioned the results of the highly interesting experiments published by the author in *Pflüger's Archiv.*, vol. xxiv., and under the head of reflex phenomena are described the reflex excitement of the sense of hearing by the various sensory nerves, especially the trifacial nerve, on the one hand, and the effect produced by the excitement of the sense of hearing upon the sphere of motion, the vascular system, and the sense of sight on the other.

It belongs to the nature of a critical review to give prominence to such points as give occasion for opposition. We have found fault with some things, and have been unable to acknowledge as improvements some of the changes made in this edition, and therefore feel the more bound to state that, in our judgment, Urbantschitsch's book, as a whole, is fully up to the present state of our science, and that it is a thorough, careful work which will be of great service both to the general practitioner and the specialist.

The illustrations are, without exception, excellent, and paper and type are all that can be desired.

### The New Editions of Roosa's<sup>1</sup> and Burnett's<sup>2</sup> Text-Books on the Ear.

In addition to the numerous new works on the ear with which the profession has been favored within the last two or three years, we have now new editions of two with which we have been familiar for some time. Particularly is this so of the work of Roosa. His name is indissolubly connected with the history of otology in America. He was among the first in this country to labor in this special field, and to add to its literature by his admirable translation of Tröltsch's work, and afterward by his own text-book, of which the edition now before us is the sixth in eleven years.

This fact is of itself sufficient to stamp its character and show deservedly great popularity. It will also render unnecessary any consideration in detail of the contents. There is the same general excellence and simplicity of style, and the same adherence to the practical aspects of the various questions discussed, as in the former editions. The great value of his book has been that it was the record mainly of the results of his own experience, whereas the opinions of others, while noted and duly weighed, are not dwelt upon at any undue length.

It may be stated as regards some of the questions which have more recently agitated the otological world, that he has not entirely abandoned the syringe for cleansing the ear, nor liquids in the treatment of otorrhœa. He has also attempted to formulate the elements of a diagnosis between labyrinthian and middle-ear deafness, and has tried to place the tuning-fork in its proper place, as a means of differential diagnosis. Categorically stated the facts are :

#### *Disease of middle ear :*

Bone conduction better.

Better hearing in noise.

#### *Disease of acoustic nerve—either primary or secondary :*

Aërial conduction better.

<sup>1</sup> A Practical Treatise on the Disease of the Ear, including a Sketch of Aural Anatomy and Physiology. By Dr. D. B. St. John Roosa, M.D., LL.D., etc. Sixth edition, revised and enlarged. New York: Wm. Wood & Co., 1885. Price \$5.50.

<sup>2</sup> The Ear: Its Anatomy, Physiology, and Diseases. A Practical Treatise for the Use of Medical Students and Practitioners. By C. H. Burnett, A.M., M.D., etc. Second edition, revised and rewritten. Philadelphia: H. C. Lea's Son & Co., 1884. Price \$5.50.

Worse hearing in noise.

In all particulars the work is brought down to our present knowledge.

The first edition of Burnett's treatise was published seven years ago, and was at once received with favor. Its chapters on the anatomy and physiology were particularly good, and its references in greater or less detail to the investigations of others gave it an encyclopedic character which is of especial value to the student. These merits are retained in this new edition, which is what it pretends to be, namely, a *revised* edition. Every page has been carefully gone over, and the most of the book has been entirely rewritten, and all that has been done in otology since the first edition is given consideration. The views of the author in regard to chronic purulent catarrh of the middle ear lean rather to the dry treatment, and his opinions on all subjects while conservative are not ultra. Both works are well printed and fully illustrated.

S. M. B.



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